RIG

Remote Imaging Group

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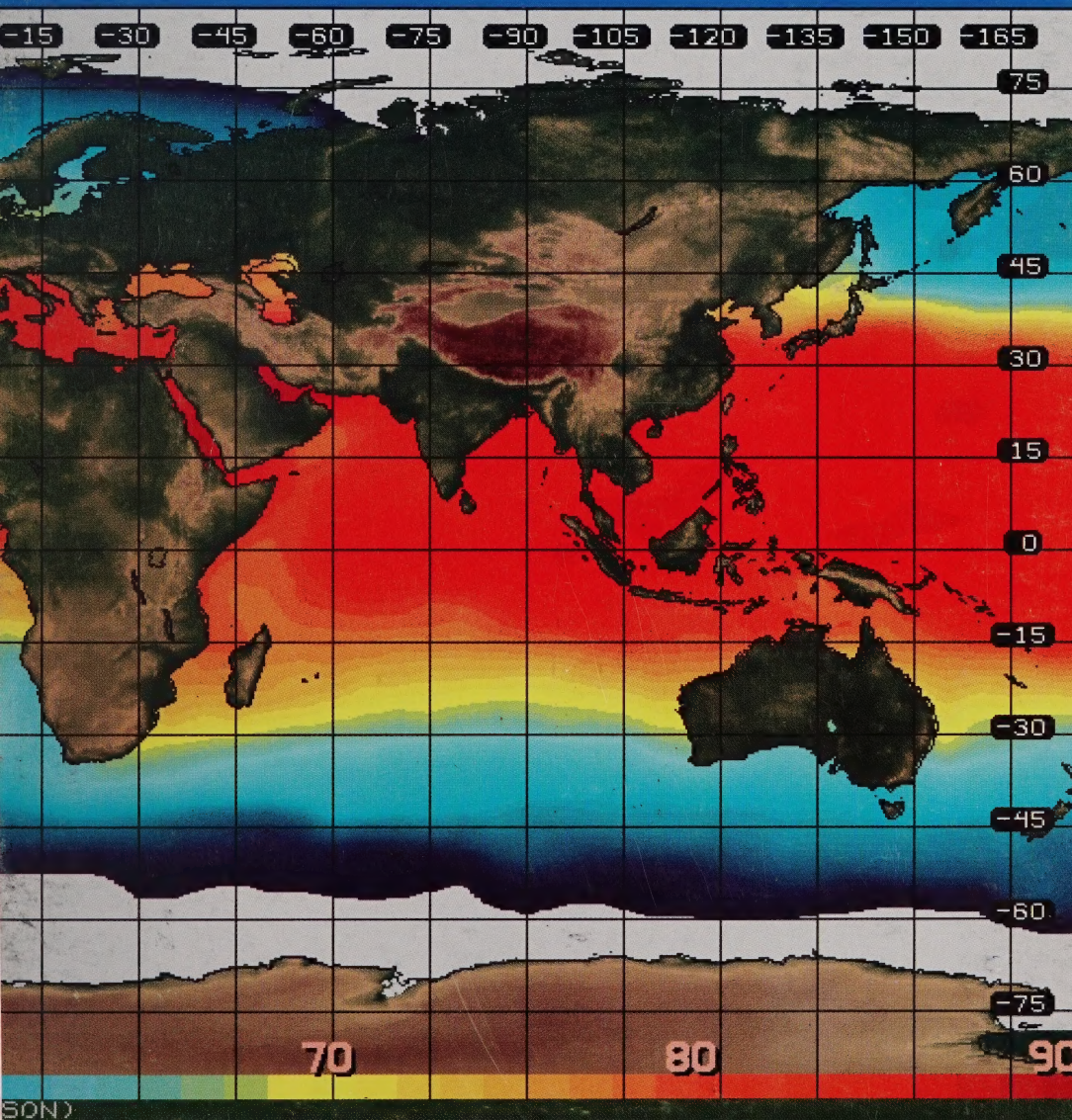

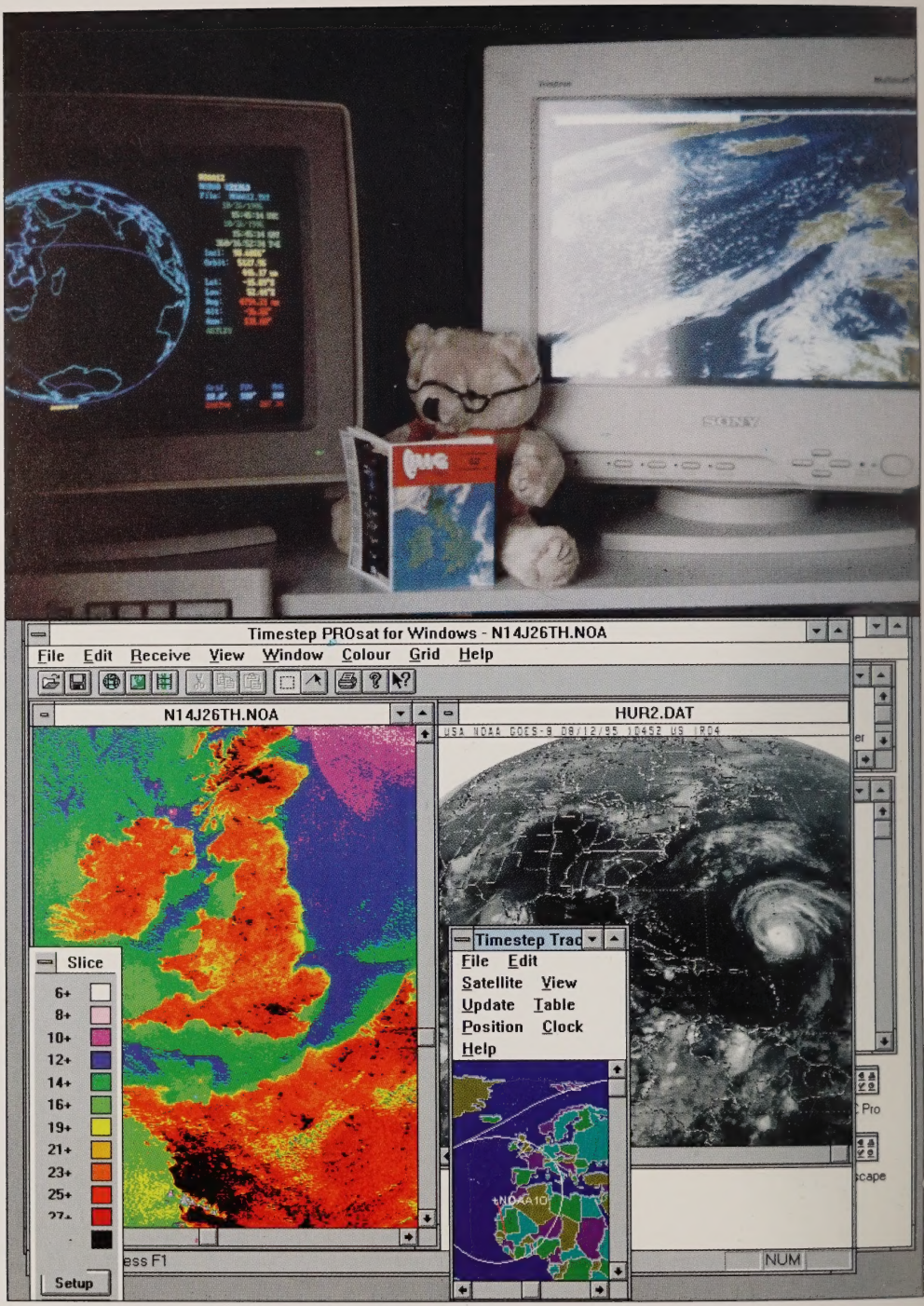
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CONTENTS DECEMBER 1995

Officers 1995		2
Chairman's report	Frank Bell	3
From the Editor's desk	Peter Wakelin	6
Membership secretary's report for 1995	Ray Godden	7
Features:		
British Millenium satellite	Frank Bell	11
Satellite image processing with Paintshop Pro	Les Hamilton	13
Atlantic hurricanes galore!	Peter Wakelin	16
A Meteosat riddle	Marciano Righini	23
A brief look at DMSP	Peter Wakelin	24
Remote imaging remotely - The easy way!	John Boyer	27
RIG*sat* RX1/RX1A - update	Godden & Taylor	30
New from Timestep - PROsat for Windows	James Brown	31
RIG regional groups		37
A JVFAX synchronous AM interface MKII.	Greg Jameson	38
A low cost RF synthesiser for weather satellite receivers	WG Sneddon	41
The Meteosat system - part 2	EUMETSAT	47
The current Russian scene	Geoff Perry	49
Receiving weather satellites - the portable option	Nicholas Freeman	51
Stored images from Okean and Sich spacecraft	Peter Wakelin	52
RIG*sat* IF1 - synchronous JVFAX interface	Godden & Taylor	55
New use for old weather satellite		55
Introducing the MSR50 - a virtual weather satellite receiver	Chris Pretty	56
Automatic receiver control using JVFAX 7.0	Chris Pretty	60
The new JVF2 interface for JVFAX	Chris Pretty	62
Regulars:		
Description of cover images		50
World weather highlights		54
Members' letters		67
Shareware corner	Les Hamilton	70
Orbiting update, all the latest news	Peter Wakelin	75
Kepler elements		80
RIG GIF library	Peter Wakelin	81
RIG helplines		83
RIG subscriptions		84
RIG shop corner		85

REMOTE IMAGING GROUP — OFFICERS 1995

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CHAIRMAN'S REPORT

FRANK BELL

This is my first report as chairman of RIG. A few words of explanation on how this has come about seems appropriate before reporting on more routine matters.

A number of members have written to me and spoken to me at rallies about the fact that in the last journal little was reported about committee officer changes other than in the list of RIG officers at the front of the journal. Perceptive members would have noticed the changes in the composition of officers. The constitutional position is that the committee is elected at the AGM and the officers such as chairman, vice chairman, secretary and others are decided upon by the committee at their first post AGM meeting.

Our first committee meeting after the AGM was in June when there was extensive and detailed discussion about individual roles and who should be appointed to each position. I was honoured to be elected chairman and other officers were elected as listed on page 2 of this journal.

I fully recognise that I am treading in the footsteps of a giant. In no way will I try to be the reincarnation of Henry Neale. Henry is unique; the founder of RIG and still the most respected and knowledgeable committee member. I have always been impressed by his detailed knowledge of our members as well as the technical issues of our hobby. He has a wide knowledge of radio, computing and people. The most satisfying outcome of changes in officers is to know that Henry is still there, as supportive as ever and still working hard on behalf of RIG members. If I may paraphrase one of Henry's comments at the last committee meeting; "I certainly have not finished serving RIG members yet; in ten or fifteen years perhaps but not yet." Just my feelings Henry; RIG's strength lies in its membership and how their interests can best be promoted, not to mention members' contributions to the developing skills of the group and sharing technical knowledge. I did ask Henry if he would be willing to have his service to the group reported in this journal. In his modest and gentle way he declined; "Perhaps in ten or fifteen years but not just yet." Never the less, thanks must go to Henry for bringing RIG into existence and it is good to know that he is still aboard and in minute to minute contact with members at rallies and via the RIG BBS; long may it continue.

I hope members will understand that it has been better to report these matters later rather than sooner to allow events and feelings to be expressed in a considered manner rather than in the short time which was available between our first post AGM meeting and Journal 42.

Still on the subject of committee officers, I am very concerned that our long-standing treasurer, Mark Clarke, is having difficulty in relinquishing the role. Mark has done superb service for many years but it is not fair to impose on his goodwill at a time when he needs to devote more time to his own business. In short we are looking for a new treasurer. If you feel you could undertake the role of treasurer to a flourishing organisation then please get in touch with me or any other committee member to discuss the matter.

Space Minister Ian Taylor, MBE, MP (left) with Frank Bell on the RIG stand at Southampton.

I was pleased to receive an invitation from the Remote Sensing Society, RSS, for RIG to have a stand at their 4 day annual conference in Southampton. The interests of the RSS most certainly overlap with RIG but they tend to have strong professional and academic interests whereas RIG has its grass roots in the amateur and technical

hobby areas. The significant overlap in our organisations is in education. Together with RIG secretary John Tellick, we established an exhibition stand showing typical RIG activities. We were the only stand in the whole exhibition to run live satellite reception. In the educational lecture stream I gave a short presentation about RIG and left those present in no doubt about the benefits of membership. I was very pleased when the space minister, Ian Taylor MBE MP visited the RIG stand and I briefly told him about our activities. I would like to develop a closer relationship with the RSS as we certainly have complementary interests.

Some members will have visited our stand at the recent BARTG rally at Sandown Park. It was a late decision to attend this rally but I was pleased we went. Your committee will constantly review rally policy. Of course it would be great if we could attend all major rallies but the logistics and practicalities of manning the stand also have to be considered. If you would be willing to help at selected rallies please get in touch with a committee member. In fact we are looking for somebody to act as rally manager. Volunteers please; remember RIG belongs to you!

I would like advice from members about an annual conference. Three years ago we held the Daventry weekend and for the past two years there have been the one day conferences at Guildford. I am quite willing to run a further event at Guildford for either one or two days but I am sensitive to the geographical distribution of members so the venue for the conference should perhaps rotate. Please let the committee know your preferences, bearing in mind the distribution of RIG members and that, ultimately, somebody will have to organise the event. If you know of a suitable venue for a conference, a school or exhibition centre for example, and are willing to assist, then please let us know. General comments can go on your membership renewal questionnaire.

You will see elsewhere in this journal an article written by me about the project for a science, telecommunication and remote sensing satellite. If you value what is being proposed you must respond positively as I am committed to producing tangible evidence to the main funding agency for this project. A half-hearted response will be bad news and may jeopardise the project.

Finally, be assured that your committee will continue to work on your behalf. However, we also recognise that out there within the membership there is a wealth of technical and creative talent that the group needs to tap. If you feel that you have views, ideas, projects, influence, suggestions etc. that would benefit the group, please let us know. ⊕

FOR SALE. Dartcom 137MHz receiver, JVFAX decoder, cables, crossed dipole aerial. £160 + carriage. Trevor Worall. 01709 371694 after 6pm.

FROM THE EDITOR'S DESK

PETER WAKELIN

Although NOAA is obliged to operate just two polar-orbiting weather satellites, resources have permitted them to keep four operating for some considerable time. With the demise of NOAA 9 's imaging capabilities after a remarkable 10 year lifetime and the absence of APT from NOAA 10, we are now down to two. The Europeans have been having a clear out as well prior to the administrative changes which take effect in December. Meteosats 3 and 4 have been pushed out of geostationary orbit and are destined to spend a few million years silently circling the Earth.

We have gained one new one which is proving to be very interesting indeed. Sich 1, which is an Okean with another name, went up in late August and, like the Okeans, is proving to be quite unpredictable in its transmission pattern. Even when you are lucky enough to catch a transmission you may be in for a further surprise when you see an image of the Amazon jungle or the western Sahara appear on your monitor. After hearing nothing from it for almost two weeks I was beginning to think it had gone into early retirement when, just this morning, it broke its silence with a fine radar image of eastern Europe. With visible images somewhat lacking in illumination at this time of the year and thermal infrared images lacking the large temperature ranges of summer and appearing somewhat 'flat', the interesting radar images are well worth pursuing.

All of the above topics are covered in more detail in this issue. Hurricanes and typhoons have featured prominently in the news recently and quite a few images of these immensely energetic systems appear this time. With weather and image interpretation appearing elsewhere in this issue, I have held over my regular piece on this subject until the March issue. With just over 100 pages this time we are at the limit of the binding method we use. It is nice to see one or two new names amongst the contributors to this issue but more are needed as there is a finite limit to what the editor and other committee members can churn out.

Our World Wide Web pages on Internet are developing slowly and the usage figures are encouraging. We have already gained several new overseas members by this means although that was not the primary reason for introducing it. We have added a section for interesting or unusual images and plan to add orbital elements, or a link to a suitable alternative site from where they can be obtained. The URL is http://www.bbc.co.uk/john_wxpics/rig/index.html. I propose starting a regular Internet page in the Journal now that at least 250 members have access. Please Email any snippets of information you think may be of interest to other RIG users. ⊕

MEMBERSHIP SECRETARY'S REPORT FOR 1995

Ray Godden, G4GCE

As of October 26th: TOTAL RIG MEMBERSHIP = 2050 ('94 = 1875)

Analysing the figures:-

Renewing members	1,655 - 85% of 1994 ('94 = 80%)
New members 1995	401 - 20% (430 - 23%)
1994 members not renewing	291 (375)

It would appear that 1994 was anomalous, with a low renewal rate, as it has now returned to the historic value of 85%.

Radio amateur members	1,230 - 60% (1,113 - 60%)
Overseas members	410 - 20% (319 -17%)

The percentage of licensed amateurs remains remarkably constant. Overseas membership has increased significantly. Compared to last year at the same time overseas membership is up by 32% - UK membership by 5%. In terms of numbers UK membership has increased by 75 and overseas by 91.

By country:-

Sweden	56	The Netherlands	41	United States	40
Ireland	36	Australia	27	New Zealand	23
Belgium	20	Germany	20	Italy	19
France	14	Norway	11	Spain	10
Denmark	8	Malta	7	West Indies	6
Switzerland	6	South Africa	5	Luxembourg	5
Greece	5	Finland	5	Oman	4
Canada	4	Arab Emirates	4	Japan	4
Austria	3	Zimbabwe	3	Iceland	2
Falkland Islands	2	Mauritius	2	Hong Kong	2
Portugal	2	Argentina	1	Botswana	1
Borneo	1	Cyprus	1	Israel	1
Faroes	1	Kenya	1	Korea	1
Thailand	1	Poland	1	Réunion Island	1
Russia	1	Samoa	1		

We now have members in 45 countries compared to 39 in 1994. Sweden remains in the lead followed by the USA, The Netherlands and Ireland.

UK membership by county:-

Yorkshire	74	Hampshire	70	Greater London	68
Surrey	67	Sussex	65	Essex	63
Kent	59	Devon	56	Hertfordshire	49
Avon	48	Dorset	41	Lincolnshire	39
Cambridgeshire	38	Cheshire	37	Lancashire	37
Buckinghamshire	36	Berkshire	35	Merseyside	34
West Midlands	34	Cornwall	32	Bedfordshire	31
Nottinghamshire	31	Suffolk	31	Derbyshire	29
Staffordshire	28	Strathclyde	27	Gloucestershire	26
Oxfordshire	26	Glamorgan	25	Leicestershire	25
Hereford/Worcester	24	Greater Manchester	24	Somerset	23
Humberside	21	Norfolk	19	Isle of Wight	18
Wiltshire	18	Cumbria	16	Shropshire	15
Northamptonshire	13	Tyne & Wear	13	Warwickshire	13
Dumfries/Galloway	12	Gwent	12	Clwyd	10
Dyfed	10	Tayside	10	Cleveland	8
Grampian	8	Gwynedd	8	Northumberland	8
Central	7	Highlands	7	Borders	5
Isle of Man	5	Lothian	5	Durham	4
Fife	4	Jersey	4	Antrim	3
Down	3	Londonderry	3	Orkney	3
Tyrone	3	Powys	2	Shetland	2
Fermanagh	1	Guernsey	1	Western Isles	1

There was again an enthusiastic response to the Activity Survey with many members providing welcome comment and information. Please make your feelings known to the committee this year.

The following analysis uses only data from this year; all previous data were deleted.

Receiving:-

Polar orbiters 1,321 ('94=1,154) Geostationary 758 (655)

HRPT 65 (53) PDUS 64 (52) HF Fax 565 (N/A)

The number of those receiving the high resolution modes has again increased, but not at the same rate as last year. RIG members are active - 70% are directly receiving one or more of the weather satellite modes! Also, many are receiving HF Fax.

Viewing method:-

Computer	1,144 (906)	Frame store	196 (209)

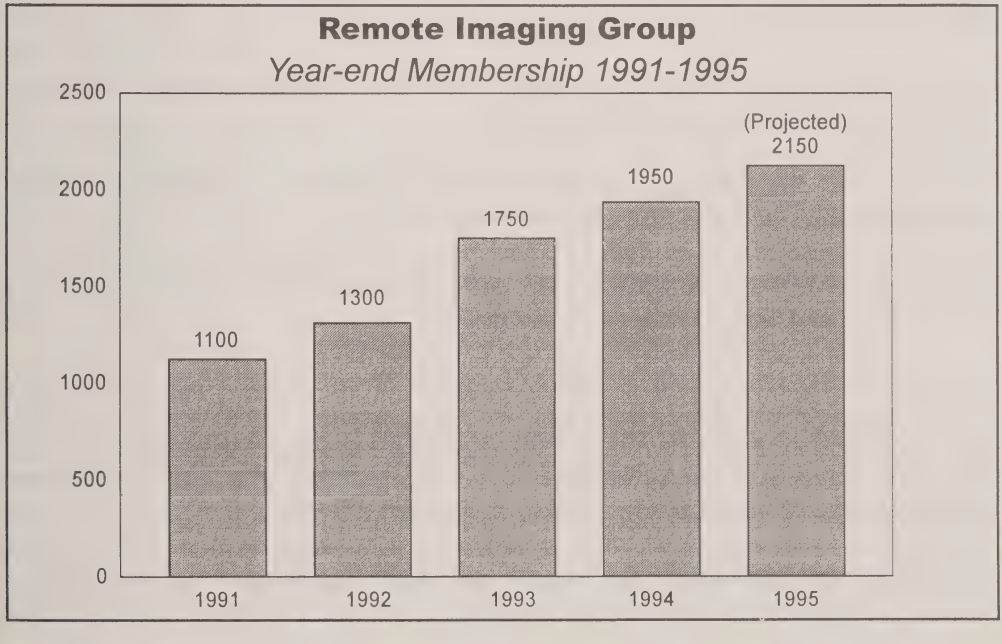
The trend towards viewing by computer continues but many (including myself) are loyal to their frame stores.

Types of computer:-

IBM compatible	1,045 (796)	Archimedes	54 (49)	BBC	49 (51)
Amiga	48 (44)	Atari	14 (17)	Macintosh	7 (6)

The PC continues to gain popularity but the decline in the other types seems to have halted, or even reversed in some cases.

Interference:- 375 (381) This is a high figure but last year's disappointing rate of increase has not continued. More information on this subject was requested on the form this time. We had hoped that this would yield some insight into the relative performance of receivers etc. but this hope was not entirely realised. The only conclusions are that all makes of receiver are prone to interference - as one might expect older designs more so - and the higher VHF frequencies (137.62MHz and 137.85MHz) are most affected. Probably this is because there are pager transmissions just above and below 137MHz and another transmission around 137.82MHz.



117 members state that not selling equipment at rallies will cause them difficulties.

We have 218 (187) members involved in some way with education, a significant increase which is most welcome.

This is my fourth year as Membership Secretary. During this period the membership has just about doubled and the work load has correspondingly increased. However next year two factors will lighten the load somewhat - 640 of you have already paid for 1996 and John Tellick has agreed to deal with enquiries resulting from our advertising. This involves opening around 600 letters a year, printing and stapling Information Packs, folding them and inserting them into SAEs (if one was sent otherwise addressing one) and answering any specific questions that came with the request. Then they can be stamped (if necessary) and posted. John is also now responsible for sending out the 400 or so reminders to those who have not renewed by mid-year. Thanks John!

Enough whingeing* about this onerous unpaid job. It comes with compensations of much, invariably amicable, contact with RIG members and opportunities to make new friends. This year quite a lot of time has been spent, in co-operation with Bryan Taylor and Michael Gill, on the RIGsat RX1 and RX1A receiver project. Interest has been far beyond expectations, which has repaid all the effort. We are encouraged to develop more projects for RIG members to satisfy the home-brewing demand revealed by the activity survey.

Now The Message:-

Please check your address label. If it says 'PAID 96' you do not need to send any subscription to continue membership next year.

If it does not YOU WILL NOT RECEIVE ANY MORE JOURNALS UNTIL YOU RENEW. Please do not wait for a reminder.

If you have already renewed you are still welcome to complete and return the survey form.

*** DO IT NOW ***

For our non-anglophone members. Whingeing: Colloquial, meaning persistent irritating complaining. Possibly from whining + complaining. Example: (Australian) "Whingeing pom" or (stronger) "Whingeing pommy *******".

*Pom: Explanation next time.

BRITISH MILLENNIUM SATELLITE

Frank Bell

A proposal exists for building and operating a low Earth orbiting micro satellite. The purpose of this project is to celebrate the turn of the millennium and British scientific, technological and engineering achievements. Although Britain does not spend enough on space research, what is done in selected areas is excellent. Science and remote sensing are two of Britain's chosen areas and we are probably world leaders in both.

The proposed satellite will be designed with amateur and educational users in mind. This means having a strong radio footprint from the satellite and a simple receiver interfaced with a standard computer. The cost of receiving equipment is currently judged to be about £50. Software for display and data analysis will be freely available.

The payload of experiments will be appropriate for investigating the near-Earth environment but there is also a plan to carry a multi-spectral CCD camera. The camera will be able to image, in wide or narrow angle, any part of the Earth's surface. The stored image will be downloaded when the satellite over-flies the UK. Data compression techniques should allow high resolution images to be downloaded directly into amateur and educational stations. In addition, all images will be made freely available on a BBS or over the Internet.

The planned launch is to be with Landsat 7 on a McDonnell Douglas Delta rocket in 1998. This will put the proposed Millennium satellite into a sun-synchronous orbit which will be ideal for the mission.

There is already widespread support for this mission from the British space industry, UK government agencies and the European Space Agency. It is hoped that all these organisations will contribute either directly, or in kind, to the project. However, 50% of the capital cost is being sought from the Millennium Commission. The Millenium Commission already know of the project and they seem to be supportive but before granting funds they have asked for further details. One thing they need to be sure about is genuine, and documented, widespread support for the project.

In order to demonstrate that support does exist for this satellite project I have a target of collecting 2000 letters of support to show to the Commission. I need the help of every RIG member to achieve my target. If you feel that this project to build and operate a satellite, which will return experimental scientific data and high quality images to modest amateur and educational receiving stations, is worthwhile, then please write to me and say so. Ask your friends and colleagues to do likewise. I will use these letters as evidence to the Millennium Commission of support for the proposal from a target user group. If you can write on headed or institutional paper, that

would be great. If not, then ordinary paper will be fine but, whichever it is, please write to me. This project needs YOUR support. Do not neglect to support this project; please write to me in November or December 1995.

Write to: FJ Bell (Millsat), Coturnix House, Rake Lane, Milford, Godalming GU8 5AB.

I cannot promise individual replies but I do promise to keep members informed via this journal. Write your letters now please; if you can, say you support the project, say you think it will celebrate British achievements in space science and remote sensing and say how you are looking forward to receiving data directly from a British satellite. ⊕

NEW IMAGING SENSOR

A new imaging sensor, which is virtually a camera on a chip, is in development for NASA's space programme and under consideration by several major companies for licensing. The new development is called the Active Pixel Sensor and was developed at NASA's Jet Propulsion Laboratory under the leadership of Dr. Eric Fossum.

Charge-coupled devices (CCDs) were developed more than 20 years ago by the Bell Laboratories and were a great advance on the earlier Vidicons and other tube technology. Modern CCD arrays cost around $1,000 per million pixels but Active Pixel Sensors are made within mainstream microelectronics technology which can potentially reduce costs to under $200 per million pixels, according to Dr. Fossum.

The technology used to develop the Active Pixel Sensor is called complementary metal-oxide semiconductor, or CMOS. CMOS is used for nearly all microprocessors and memory chips. Currently, the cost of manufacturing a CMOS image sensor is about one third that of a CCD image sensor. The CMOS Active Pixel Sensor was developed for space applications in which it has several advantages over CCDs, including the requirement for less power and less susceptibility to radiation damage in space.

Other applications, Dr. Fossum said, include personal computer visual communications, high definition television, electronic still cameras, medical instruments, automotive applications and space-based surveillance systems. ⊕

FOR SALE. Amigasat 3.1 weather satellite decoding and processing package for the Amiga. Complete with manual, software and interface unit. £50 ono. Tel Owen, 01603 410229. Norwich.

SATELLITE IMAGE PROCESSING WITH PAINTSHOP PRO

Les Hamilton

The new, enhanced version 3.0 of the award-winning shareware application Paintshop Pro became available earlier this year. It possesses features that makes it particularly useful in the field of weather satellite imaging. It is not my intention to undertake a full review of the software but rather to concentrate specifically on how its use can enable RIG members to get the most out of their wxsat images. What follows relates specifically to images downloaded using PROsat II, although the techniques described should be equally applicable to other capture systems where the image is stored in RAW format.

PROsat II images

When wxsat images from the polar orbiting satellites are saved from within PROsat II, they are stored as files of type .NOA. Apart from a header area containing details relating to the time of capture, the PROsat II settings in force during acquisition, and possibly the Keplerian elements (if saved with the file), these files are unmodified raw bitmap images. Although sections of Timestep's .NOA can be saved and screen dumps made, the PROsat II software does not permit the making of an image file of the entire pass at full resolution for use in other programmes.

One way of converting entire PROsat II .NOA files into full resolution images for viewing is the utility NOATIFF (RIG 41, page 11), which creates a TIF image, which can then be converted to GIF or whatever. However, Michel Geeraert from Koksijde in Holland informs me that NOATIFF fails with a 'Not enough memory' error on his machine, despite having 16Mb RAM on board, so this is by no means a universal solution.

Loading .NOA files into Paintshop Pro V 3.0

Paintshop Pro has the facility to load images of type RAW, and it is this feature that allows us to operate directly on the PROsat II .NOA files. Although .NOA files can be loaded directly, it may be advisable to make a copy and change the extension to .RAW. This can be achieved using the Windows File Manager 'Copy' option, or alternatively by typing COPY PICNAME.NOA PICNAME.RAW at the DOS prompt to create a working copy of your file, whilst retaining the original.

Now boot up Paintshop Pro, and click on <Open> under the <File> menu. Next select <RAW - Raw File Format> in the filetype browser, then select the desired image file. This action reveals the <RAW Options> selection box. Now the very nature of a RAW file is that no information about the size and proportions of the image is contained within it. This must now be supplied. The Option Box asks you to enter "Header Size (Bytes)", "Width (Pixels)" and "Height (Pixels)". The Header Size entry can safely be ignored as it does not impinge significantly into the image area. For NOAA and

Meteor images, 1200 must be entered in the "Width (Pixels)" box. In the case of Okean, this number should be reduced to 600.

The entry for image height is slightly more of a problem as it has to be calculated. Turn to File Manager, and make sure that the <All File Details> option is checked in the <View> menu. The size of every file, in bytes, is now displayed beside it. If working in DOS you can obtain the same information by typing DIR. Divide this figure by the width of the file (1200 or 600) to find how many image lines there are, and type this figure into the 'Height (Pixels)' box. Finally, make sure that the "Single Channel (Greyscale)" option is selected, and click OK to load the image.

You can also load .DAT files produced from the geostationary satellites in similar way. The only differences are that the width and height values are now 640 pixels and 800 pixels respectively.

Saving Your Image

With the image at last on screen, select the <Save as...> option from the <File> menu, and your preferred filetype for image storage (GIF, BMP etc.) then type in a suitable filename before clicking OK. This saves the original PROsat II image in full resolution. Depending on whether the satellite was travelling north-south or not, the image may be reversed or inverted. Use the <Image> Flip/Mirror/Rotate options to correct this before saving. You will also need to resize the image in one direction to restore conformal scales in north-south and east-west directions. Use the <Image> Resize option and disable Maintain Aspect Ratio to do this. Increasing the width by 60% seems about right.

Removing Noise from Images

Noise on wxsat images is, unfortunately, becoming more of a problem as the years roll by and pager stations mushroom all around our major cities. Essentially, 'noise' in weather satellite images takes two forms, single, isolated pixels which appear as tiny speckles, most noticeably of peak white, which intrude on the image or more general bands or patches of interference caused by lapses in reception, bursts of pager interference and so on. The former are easily corrected by using features from PSP's <Paint> and <Select> Toolbars. After a click on the <Select> magnifier tool, several clicks over the image itself will zoom in until individual pixels are visible. Click on the 'eyedropper' tool, and then on a pixel of normal shade adjacent to the 'speckle'. Move to the <paint> toolbar, and click on the 'pen' (4th icon from the top on the left hand side). Clicking the speckle itself now results in an immediate change of shade to that selected with the 'eyedropper'.

Extended areas of interference are more of a problem, and it can be extremely tiring and frustrating to attempt such a task manually. Fortunately, Paintshop Pro contains a number of filters which can be applied to the entire image, or just to a selected

portion of it. I find the best effect to come from the 'despeckle' and 'median' filters under the <Image / Special Filters> menu. Using either the 'rectangle' or 'oval' selection from the <Select> toolbar, the mouse may be utilised to drag an outline around an affected area. This can be done while under zoom, giving very fine control to the process. Once an area has been selected, use the mouse to choose an appropriate filter. A degree of experimentation can be attempted, as each operation may reversed using the 'undo' feature of the <Edit> menu if it does not meet with approval. Many image processing applications only permit the use of a filter over the entire image. PSP's ability to apply filters over a selected area only, avoids the general overall blurring effect often produced by complete filtering.

Adding text to images

Paintshop Pro has facilities for the addition of a border at the foot of an image, and also addition of text. The <Image / Enlarge Canvas> menu selection allows you to define an enlarged image size and, provided the 'Centre Image' box is unchecked, increasing the image height adds a border to the foot of an image only, ideal for the placement of informative text. The border defaults to white but the paint tools may be used to convert it to black, or another colour. The <Paint> toolbar includes a text icon that opens a pathway to the full range of true-type fonts available in your computer. Text typed in the 'Text' panel at the foot of the selection box can be moved anywhere over the image, and dropped into position by clicking the mouse.

In summary, Paintshop Pro for Windows is one of the best budget priced image processing packages to appear in a very long time, boasting most of the features of the popular DOS application NEOPAINT, but featuring many more filetypes. It has a number of features that are particularly useful in the field of WxSat image enhancement. I can thoroughly recommend registering the package (which brings you version 3.11). The total price, including VAT and P&P is just under 62 pounds, but try the shareware version from the RIG Shareware Library first (ask for Disk PSP). Paintshop Pro is marketed in the UK by Digital Workshop, 19 Parsons Street, Banbury, Oxon. OX16 8LY. Tel. (01295) 258335. ⊕

WEATHERWATCH UK INFORMATION AND TELEPHONE MESSAGE SERVICE

Please note that this service ceased on 31 July 1995 due to changes at RAE (now DRA) Lasham and is unlikely to be reinstated. Some members may have used this service to obtain reference orbits for the NOAA satellites but this is no longer possible.

For members who are unaware, there are several free computer satellite tracking programmes on the RIG BBS and weekly updated orbital elements to keep your predictions accurate. John Tellick. ⊕

ATLANTIC HURRICANES GALORE!

Peter Wakelin

Allison, Barry, Chantal.....Pablo, Roxanne, Sebastien and now Tanya. There's just about time to see Van and Wendy before the season ends. Is it unusual to see so many in a year?

At this point I'll say a few words about the naming of these storms. In some parts of the world strong tropical cyclones are known as hurricanes or typhoons but they are all the same. When they form and until the sustained wind speed reaches 17m/s they are called tropical depressions and allocated a number. If the sustained wind speed increases to more than 17m/s they become tropical cyclones and are allocated a name from a pre-determined list. It is not until the winds reach 33m/s, which is 64 nautical miles per hour (knots) or 74 statute miles per hour, that they become hurricanes or typhoons. On rare occasions, temperate latitude storms can attain wind speeds as high as this (such as the one over southern Britain 11 years ago) but they are not hurricanes.

On average over the last 30 years or so there have been about 10 a year of tropical storm strength or higher in the North Atlantic of which fewer than six went on to reach hurricane strength. Reliable records go back 50 years and 1969 holds the record with 17 tropical storms of which 12 became hurricanes. This year, Tanya is the 19th tropical storm of which 11 have reached hurricane strength. Going further back to when observations and records were less reliable, 1933 was a bumper year with 21 storms and 9 hurricanes recorded.

Of course it is not just the wind that is destructive, sea level rises in excess of 10m have been recorded with disastrous consequences for densly populated low-lying coastal areas. Rainfall amounts can be huge and very destructive - a metre in a day is not unknown; it takes nearly two years for London to accumulate that much! Slow-moving hurricanes such as Roxanne's recent meanderings around Yucatan can result in heavy rainfall for a week or more. The record must go to the Island of Réunion in the southern Indian Ocean where Hyacinthe deposited over three metres between 24th and 27th January 1980.

The 1995 Atlantic hurricane season got off to an early start when Tropical Depression One formed in the NW Caribbean on 3 June and strengthened to become Hurricane Allison the following day. Figure 1 shows Allison a day before making landfall near St Marks, Florida. Image courtesey Greg Deuel, DMSP Satellite Archive (http://web.ngdc.noaa.gov).

Barry spent most of its life out over the open Atlantic and was weakening by the time it reached Nova Scotia on 9 July. Chantal remained well out in the Atlantic and, like

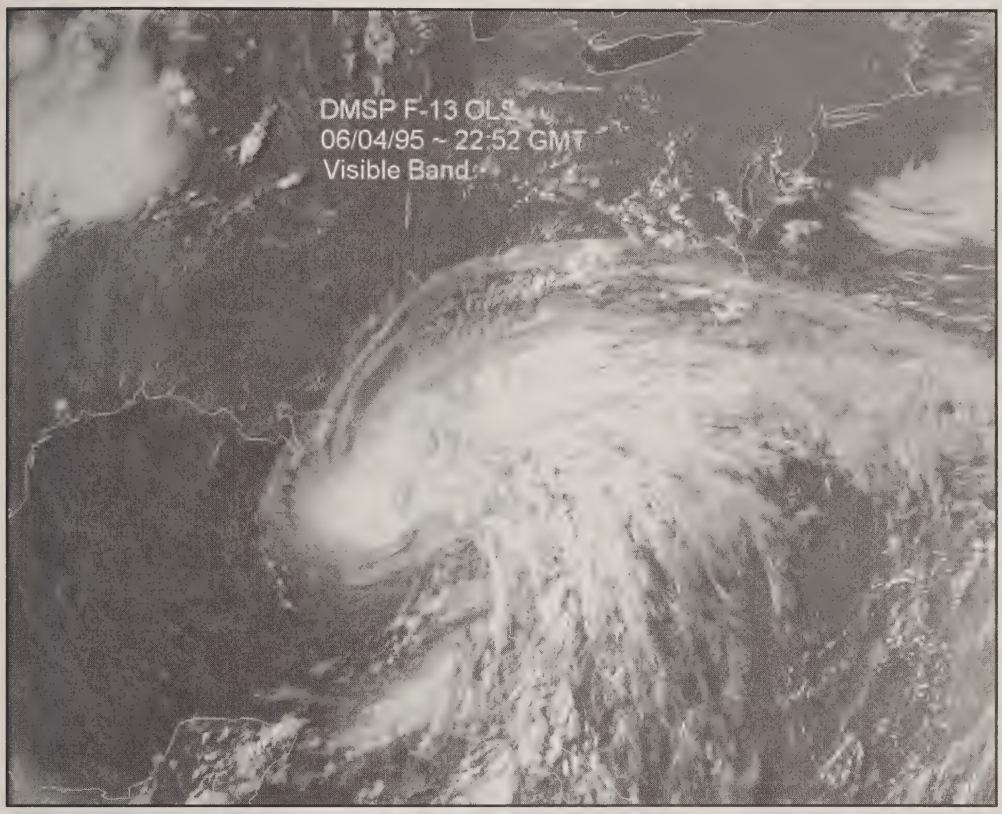


Figure 1. Hurricane Allison off the coast of Florida.

Barry, did not reach hurricane strength. Likewise, Dean did not reach hurricane strength but was large and affected much of the Gulf of Mexico.

Tropical depression number 5 became Erin which reached hurricane strength early in its life whilst passing through the eastern Bahamas on 1 August. It moved on to cross the Florida peninsula, killing several people, and dissipated over Mississippi on 4 August. Figure 2 was supplied by Marciano Righini. He produced it on his home-built photographic fax system using signals received from Meteosat 5 at 1856UT on 1 August. It shows Erin approaching Florida as viewed by the visible sensors on GOES 8.

Number six failed to gain enough strength to justify a name. Tropical Storm Seven developed west of the Cape Verde Islands on 8 August and became Felix later that day. It moved northwest and reached hurricane force three days later. Surface winds increased to 115kt at about the time of Figure 3 when in the Sargasso Sea southeast of Bermuda. (This image from Dennis Chesters' NASA-GSFC GOES Project. http://

climate.gsfc.nasa.gov/~chesters/goesproject.html). It passed to the southwest of Bermuda early on 15 August causing some damage there and went on to inflict damage to N.Carolina. Gabrielle was a short-lived storm which affected the Western Gulf of Mexico. Humberto (number 9) was the next depression to attain hurricane status but remained well away from land. Iris rapidly reached hurricane force and its slow movement near the Leeward Islands resulted in high rainfall totals there and a number of fatalities. 350mm of rain fell on Martinique.

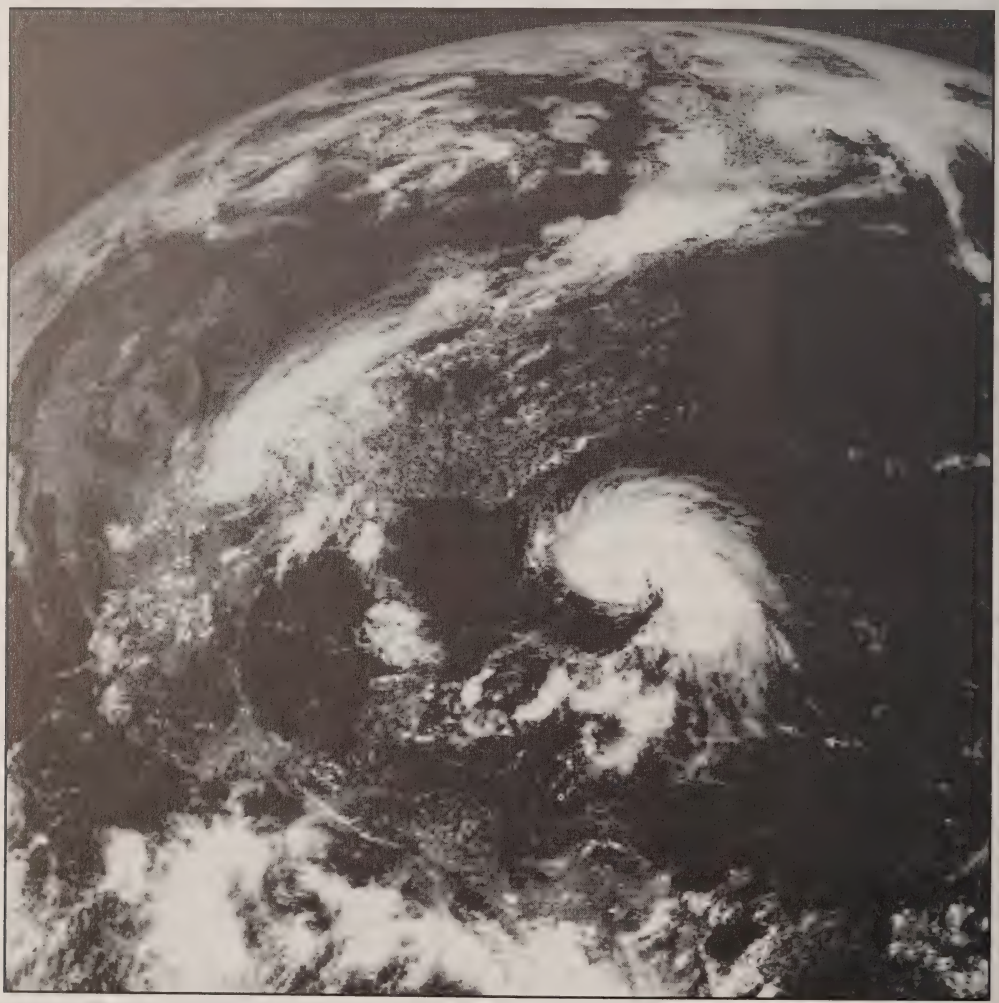


Figure 2. Hurricane Erin on1 August.

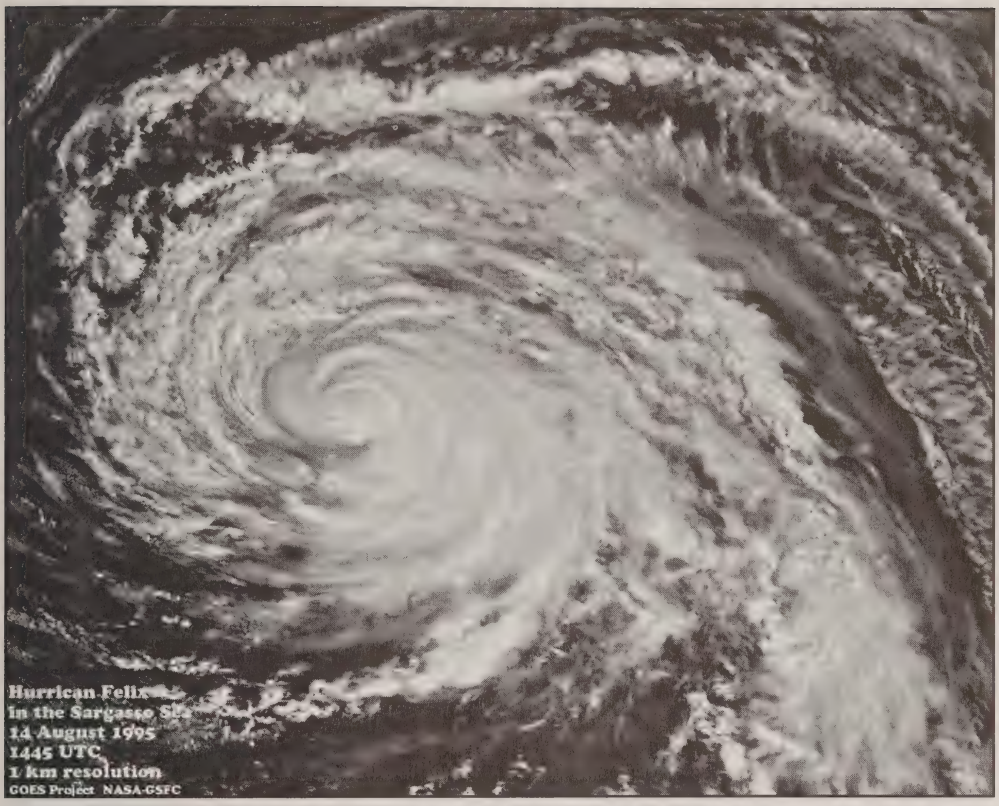


Figure 3. Hurricane Felix in the Sargasso Sea.

Jerry (number 11) became the third to affect western Florida but did not qualify as a hurricane. It went on to cause flooding and 10 deaths in the Carolinas. Karen never gained any great strength and was eventually absorbed into Iris. The 13th depression was another "Cape Verde Storm" which became Luis on 29 August with winds to 120kt by 3 September. Luis caused major damage in the Leeward Islands as its central pressure plummeted to 935 hPa. It went on to affect Bermuda and Newfoundland. Number 14 never got named but the 15th depression was very different. It formed about 700km east of Barbados on 12 September and was named Marilyn the next day and soon reached hurricane strength. The eye passed over St Croix late on 15 September and it was in the Virgin Islands that most damage was sustained with 80% of the buildings on St Thomas damaged and 9 persons killed. Figure 4 shows a detailed view of the central parts of Marilyn the following day when illuminated by the low, late afternoon sun. (Image from the same source as Fig. 3)

Noel barely made hurricane strength and remained out in the open Atlantic throughout its life. After meandering around the southwestern Gulf of Mexico for several

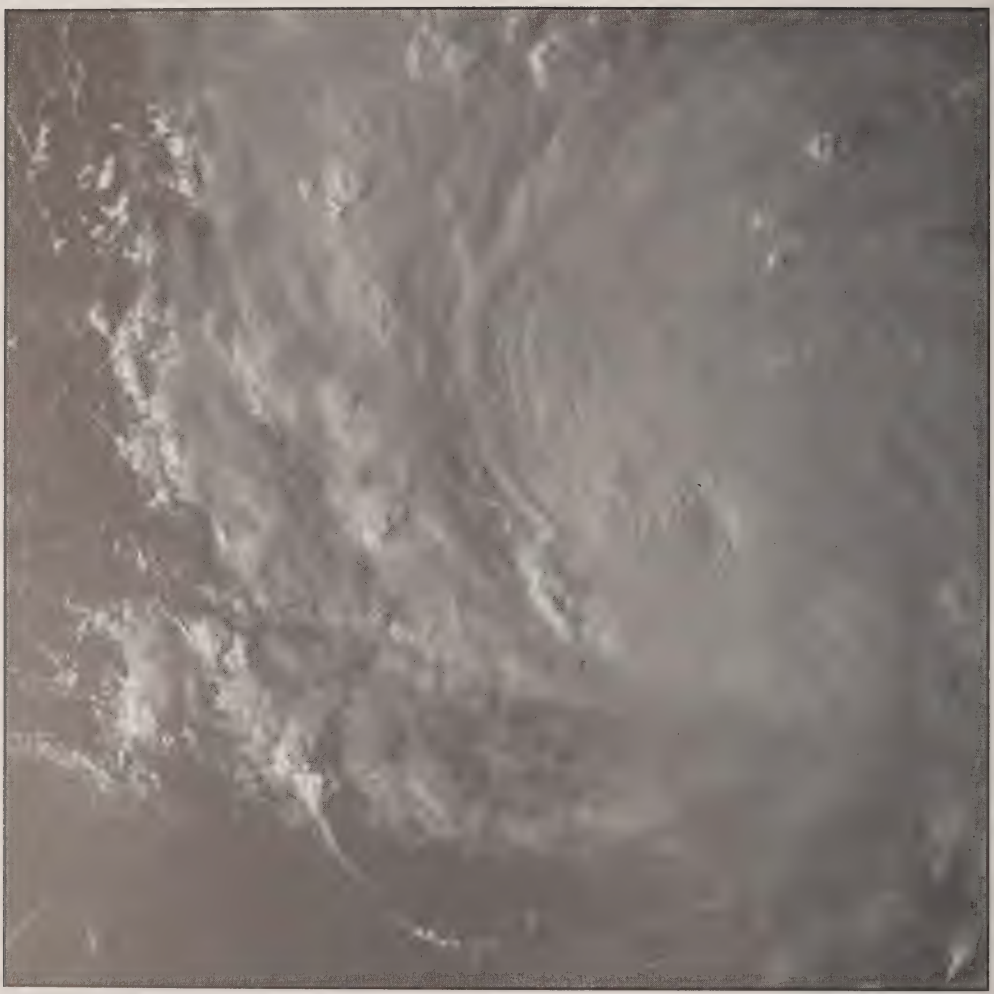


Figure 4. Hurricane Marilyn on 16 September.

days Opal (17) reached hurricane strength, moved northeast and deepened extremely rapidly as it approached the northern Gulf coast. A reconnaisance aircraft measured a central pressure of 916 hPa and sustained surface winds were estimated at 130kt. Fortunately the system weakened somewhat before giving western Florida another pounding. Hurlbert Field at Eglin Air Force Base recorded a gust of 125kt. Opal caused about 2 billion dollars of damage, killed over 20 people in the US and a further 50 in Mexico and Central America.

Pablo lived for only 3 days and dissipated on 8 October prior to reaching the Windward Islands. Q was not used so number nineteen became Roxanne which formed off

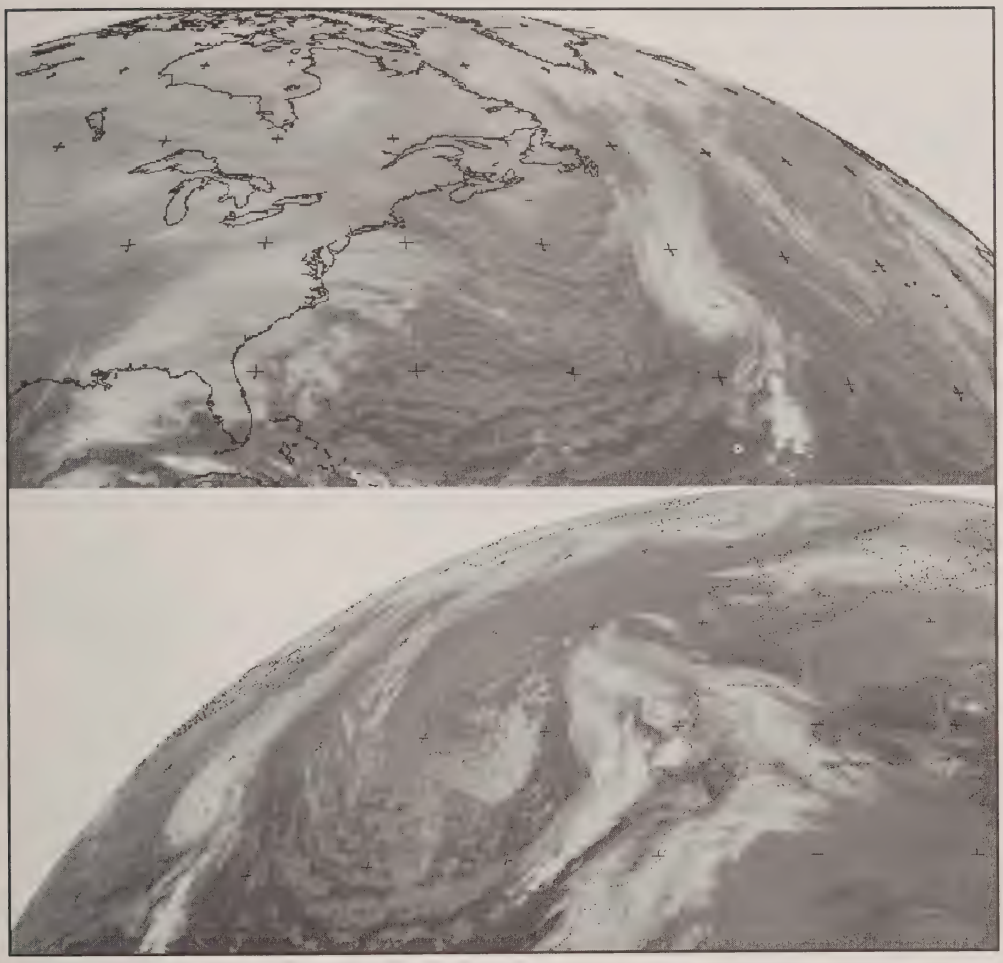


Figure 5. Wide-eyed Tanya as seen by GOES 8 (top) and Meteosat 5.

Honduras the same day. It quickly reached hurricane strength and remained near the Yucatan peninsula for a week before moving northwest and losing hurricane strength. The next one formed near 14N 54W and became Sebastien but weakened before it reached the Leeward Islands. The 21st depression formed about 800km SE of Bermuda on 27 October and soon became Tanya. After a slow, mainly northerly, movement initially, Tanya accelerated rapidly northeast, crossing the Azores on 1 November. Figure 5 shows simultaneous views of Tanya as seen from Meteosat 5 (lower image) and GOES 8 at about 0630 UT on 31 October. The GOES 8 image was relayed through Lannion, France and Meteosat 5. The following day, the remnants of Tanya just came within reach of the NOAA polar-orbiters for British watchers whilst still retaining the characteristic "eye". At the time of writing there is no sign of Van.

The map on the inside back cover shows the tracks of this year's Atlantic storms. The number of each storm appears at the start of each track. The map was produced at the Center for Ocean-Land-Atmosphere Studies, Calverton, MD, an organisation jointly supported by NOAA, NSF and NASA. I am grateful for their making this information freely available on Internet. [http://grads.iges.org]

Most of the above information on this year's storms was extracted from Jack Beven's weekly Tropical Cyclone Summaries and I am grateful for his making them available on the sci.geo.meteorology newsgroup on Internet. They are also available from ftp://squall.met.fsu.edu/pub/jack. For the statistics on past years' storms, I am indebted to Dr Christopher W Landsea of the Department of Atmospheric Science at Colorado State University who produces the document entitled FAQ: Hurricanes, Typhoons and Tropical Cyclones. (Ftp://downdry.atmos.colostate.edu/pub for the latest version). ⊕

THE LONGEST DAY OF THE YEAR

The last minute of the last hour of the last day of the last month of 1995 will contain 61 seconds making 31 December the longest day of the year.

Coordinated Universal Time (UTC) has slowly edged ahead of Greenwich Mean Time (which is not quite constant due to variations in the rotational speed of the Earth) and will be retarded by one second at the end of the year. Occasional adjustments are made, in precisely one second increments, to ensure that the two time scales never differ by more than 0.7 second.

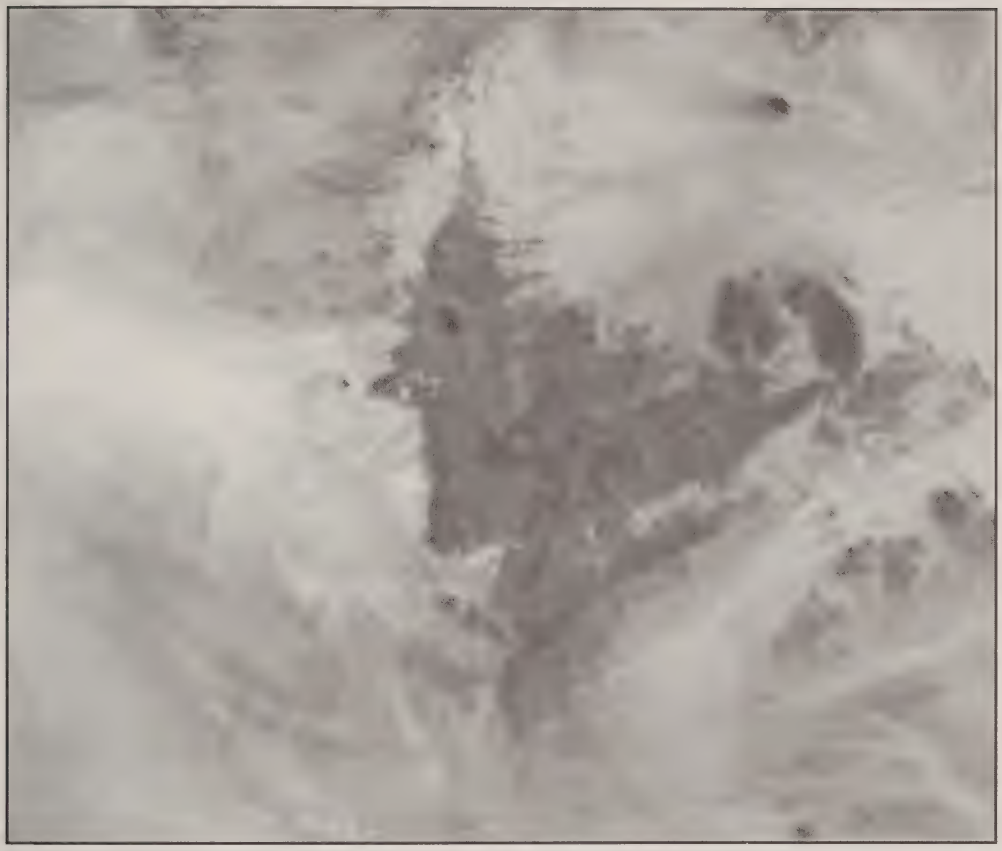
A degree of restraint will be called for by those celebrating the arrival of the new year. More importantly, satellite predictions made in January from orbital elements with an epoch in 1995 will be in error by one second if the time adjustment is not allowed for. You may find the lines of latitude on your polar-orbiting satellite images in error by about 7km. ⊕

NOTICE

NOAA/NESDIS has tentatively announced that a Polar-orbiting Observational Environmental Satellite Users' Symposium will be held June 10-12, 1996 in Annapolis, Maryland (USA). The Symposium will be to inform users of current and future plans of U.S. and international polar satellite systems, and to discuss changes occuring with NOAA's new series of satellites and the changes to direct broadcast systems in the NOAA KLM era. Complete details will be announced in the March RIG Journal. ⊕

A METEOSAT RIDDLE

Marciano Righini, I4MY



In Picture 1 above, there are no clouds. You can see the profile as it appears almost every day as it is located in a region where clouds are not too frequent.

Questions:

1. Is it a gentleman or a lady?
2. Where is it?
3. Which of Meteosat's nine D sectors split it into two parts?

Answer on page 66. ⊕

A BRIEF LOOK AT DMSP

Peter Wakelin

DMSP stands for Defense Meteorological Satellite Program but in this short article I plan to write about the satellites within the programme; in particular the differences between the imaging and related systems on these satellites and those aboard the more familiar NOAA polar orbiters. In May 1994 President Clinton approved the convergence of the military and civilian polar-orbiting weather satellite programmes (RIG 38 p56) to save money but the two systems already have some similarities.

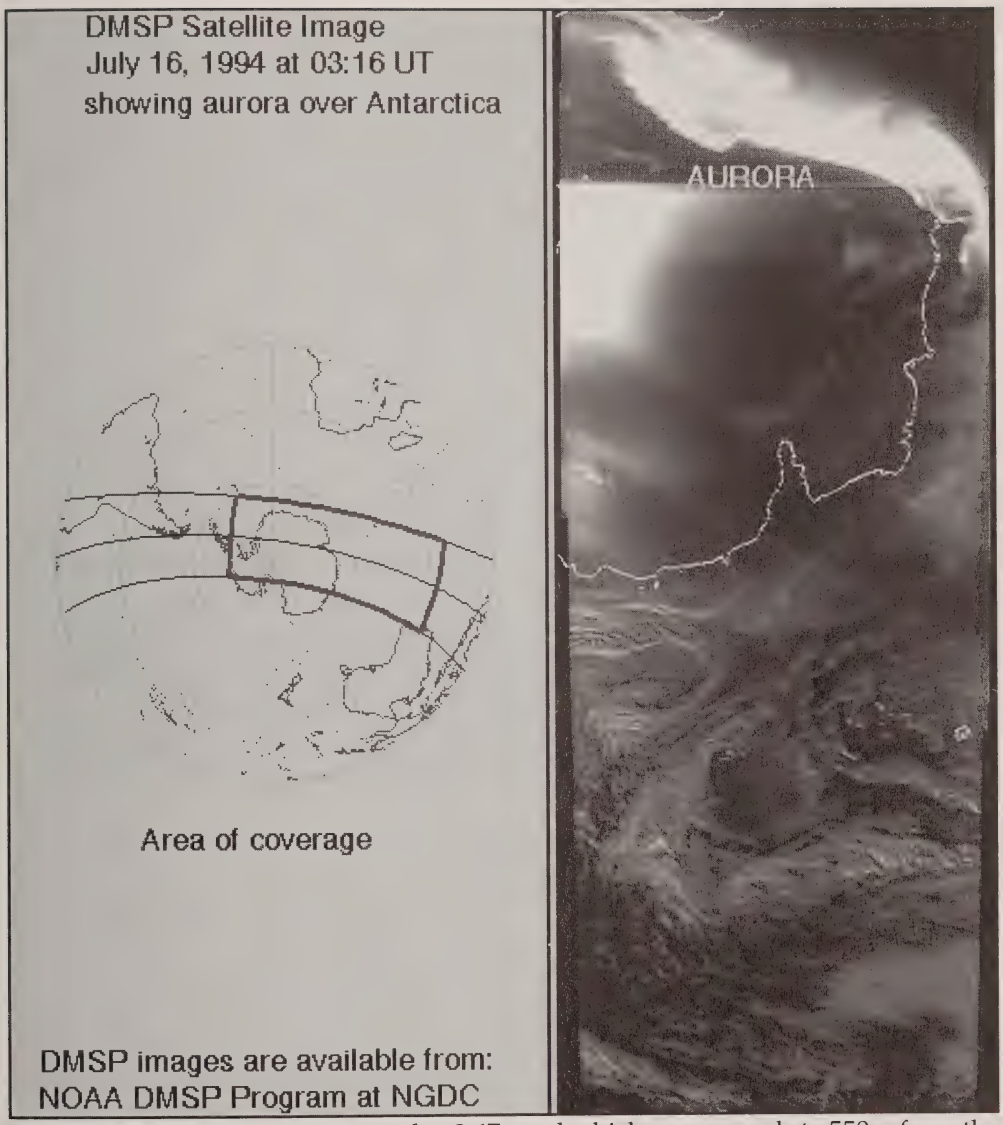
Both the latest DMSP and NOAA spacecraft's basic structures, or buses, are based on derivatives of the Block 5D-1 which was developed by RCA back in 1972. Although the payloads are unique because of the different mission requirements, the commonality among the buses was maintained as the programmes evolved.

Two major differences are that the military version has to be more robust and its sensors more accurate. The latter requires a much more elaborate precision mounting platform for the sensors with greatly improved thermal control. The temperature of some of DMSP's sensors can be controlled to better than 2 degrees. Greater precision sensors require the spacecraft's attitude control to be better too. Both craft use an infrared horizon detector, a sun detector and have the same triple orthogonal gyros and accelerometers as well as the same reaction wheel assembly. DMSP's attitude performance is enhanced by its additionally having a 6-detector static star sensor. The sun and horizon sensors can maintain a pointing accuracy of about 0.12 degree but the DMSP satellite can attain 0.01 degree with its star sensor.

Unlike its civilian counterpart, the DMSP craft carry a Flight Load Package which is an elaborate software package capable of fully controlling all the spacecraft's functions for a long period. In the event of hostilities there may be times when it is not desirable, or perhaps not possible, to communicate with the spacecraft from the ground.

The communications packages of the two systems are very similar but there are no transmissions in the VHF range to or from DMSP. Being a military vehicle its S band transmissions are not around 1.7GHz in the weather satellite part of the spectrum but near to 2.2GHz. The primary downlink frequency for direct readout image data is 2252.5MHz.

DMSP does not carry the AVHRR imaging system found on the NOAA spacecraft but has the Operational Linescan System (OLS) which operates at just two spectral bands; a visible channel covering from 0.4 to the near infrared at 1.0 micrometres and a thermal infrared at 10.2 to 12.8 micrometres. These closely correspond to channels 1+2 and 4 of the AVHRR. OLS is an oscillating scan mode device rather than the rotary type used in AVHRR and has a slightly narrower scan angle of 112.48 degrees.



Its basic resolution is twice as good at 0.67mrad which corresponds to 550m from the operational height of about 830km (similar to the NOAA craft). Unlike on the AVHRR, OLS resolution remains constant along the scan line.

Perhaps the largest difference between the two scanning systems lies in the sensivity of the visible sensor. OLS incorporates a photomultiplier system and is more sensitive by a factor of a half million. It can image in the light of a quarter moon! At these extremely low light levels the maximum resolution is reduced to about 3km. The onboard digital tape recorders have a similar capacity to those on the NOAA craft but

as the image resolution is higher it is not possible to store the data from an entire orbit at full resolution. Data "smoothing" permits global coverage in both thermal infrared and visible channels to be stored on the recorders. This smoothing is accomplished by analogue averaging of the fine resolution input from five resolution cells that are contiguous in the across-track direction, then digitally averaging five such 1 by 5 cell samples in the along-track direction. The resulting nominal linear resolution is about 3km. During a single 10-minute readout session, 400 minutes of smoothed visible and infrared data can be transmitted to the readout stations (at 1.33 or 2.66 Mbps on 2207.5 or 2267.5 MHz).

The ability of OLS to image in low levels of illumination has obvious military advantages. I cannot obtain any images taken in moonlight but the two images here demonstrate the low-light capability of the DMSP satellites.

Acknowledgement: Much of the above was taken from ENVIROSAT-2000 Report, Comparison of the Defense Meteorological Satellite Program (DMSP) and the NOAA Polar-orbiting Operational Enviromental Satellite (POES) Program. (October 1985, NOAA, NESDIS). I am grateful to Max White, Kettering Group, for sending a copy.

REMOTE IMAGING REMOTELY - The Easy Way!

John Boyer

I read the article in RIG 39 entitled Remote Imaging Remotely by Ben Ramsden with great interest. This sparked off the idea that I would take a portable weather satellite receiving kit with me on my next holiday. Even a visit to Spain would allow the reception of pictures that extend a significant distance further south than is possible from the UK.

Initially, my wife and I thought that we might go to Cyprus but at the last minute we changed our minds and opted for a much better deal to Mauritius. As the departure date approached I started to try to get some equipment together for the reception of polar-orbiting satellites.

I had anticipated being able to borrow an old laptop that had room to take my PROsat II card but the guy concerned let me down. So I was reduced to trying various tape recorders. The APT signal is well within the bandwidth of ordinary cassette ma-

NOAA 9 vis, 7 May 1994, 0540UT. Madagascar with Mauritius near right edge.

chines so it seemed very likely that this approach would be successful. I initially borrowed a Walkman style VOX operated recorder and recorded a NOAA 14 pass and played it back to my computer. At a first glance, I was pleasantly surprised as the main problem I expected to see was line tearing due to ye olde wow and flutter but the edges were ruler straight. There was, however, quite severe banding on the image almost as if it had been printed by a bubble jet printer with a duff head. I tried varying the recording levels and managed to get some improvement but the images were far from satisfactory. At this stage I would have still taken the kit as poor pictures would have been better than none at all. So I borrowed another recorder and got slightly better results.

I then phoned Ben Ramsden and learned that the problem was almost certainly the built-in ALC of the cassette machine fighting the level changes in the image. The answer was to go and buy a machine with manual level control, which turned out to be easier said than done. In fact I couldn't buy one in the required timescale of T-minus 2 days and counting.

Quite by chance I noticed whilst browsing through the World Meteorological Organisation's web pages that two people had registered polar satellite receivers in Mauritius. A quick phone call to Peter Wakelin confirmed they were RIG members and another to Ray Godden yielded their addresses and phone numbers. I couldn't believe my luck. I was definitely on a roll.

The day before departure, I bit the bullet and phoned Mauritius choosing to call Jacques Pougnet who appeared to be closest to the hotel. I suggested that we exchanged images and received a very enthusiastic response and to top it all he even uses the same PC card. As you might expect I promptly abandoned the idea of taking some kit with me and concentrated my time on browsing my archives for appropriate pictures to take.

Once in Mauritius I exchanged several phone calls with Jacques and we were invited over for dinner. Raoul Maujean, the other RIG member, was there with his wife and son. We abandoned the ladies and wandered upstairs to the computer. Is this phenomenon universal? The same thing happens at home.

The commitment of these guys to the hobby is amazing. We all think of Mauritius as being a sun-drenched, tropical island paradise. Well it isn't always. In the summer (January and February) they get a large number of intense cyclones. The reception of a picture that shows the precise location of an approaching cyclone becomes very important. When a cyclone is approaching they make a particular effort to keep their PC clocks and satellite elements up-to-date and are quite excited as the island has almost got it's link to Internet sorted and they can now obtain elements for the satellites that are right up-to-date.

Their interest in the weather goes further than this as Jacques collects antique barometers and has recently acquired one that is so old that it is calibrated in French inches. A quick application of a modern ruler revealed that there are 30mm to the French inch. Raol has been building his own kit for ages and is currently in the process of fine-tuning a homebrew az-el rotator for HRPT and has already received images with it.

I wait with baited breath for the email that announces that they have full Internet access as I will be very keen to see the next lot of cyclones due in the new year. Especially those from Raol's HRPT equipment.

I left Mauritius with some new friends and a box of floppy disks. These disks contained 12Mb of APT data and here are just a couple of those images as supplied by Jacques.

I would like to finish by thanking Jacques and Francois for making us feel very welcome in thier home. ⊕

Meteor 3-3 infrared, 26 January 1993, 1800UT. Cyclone Edwina 300km NE of Mauritius.

RIG*sat* RX1/RX1A - UPDATE

Ray Godden and Bryan Taylor

The project has continued to be popular and orders have now passed 250. Our stock of the original 10.7MHz filter has run out and there are 40 PCBs left. We have found enough of a similar filter for these remaining boards but unless another source of supply can be found there will be no point in ordering more PCBs. We recommend that you contact Peter Wakelin for the latest stock situation before ordering one.

PCBs for the RX1A 5-channel upgrade are now in stock and have been sent to those who have already placed orders. This board was designed using a CAD package (Ranger 2) which integrates schematic capture and PCB layout. We are pleased with the manufactured boards which have plated-through holes and silk screened component layouts.

The RX1 design appears to be robust with very few difficulties reported. We are not aware of any new specific problems beyond those mentioned in RIG 42, but just to remind you:-

1. The ground pins of IC1 must be soldered to the top (ground plane) side of the PCB also pin 9 of IC5.

2. Care should be taken with the antenna connection or instability may result. It should be connected with coaxial cable, with the braid soldered to the ground plane near to the point where the inner is connected.

Consideration is being given to an RX1 successor - we will keep you posted! ⊕

RIG ACTIVITY SURVEY FORM - INTERFERENCE

I would like to get as much feedback as possible about the interference our members are experiencing. Please use the space towards the bottom of the form for any additional comments. In urban areas there are many sources of 'electrical' interference - motors, switches, thermostats etc. I would like some idea about your RF interference. For those lucky members who do not know what a pager sounds like, it is a transmission of varying length with - in the case of Mercury at 137.975MHz - a two-tone audio "bee baa" followed by a raucous string of data. Sometimes this will be followed by another lower frequency "bee baa" and another string of data. Because numerous channels are in use, intermodulation products may be heard at various points throughout the 137-138MHz band, especially in the lower quality receivers. If interference is computer generated it will, of course, disappear when the computer is switched off. John Tellick. ⊕

NEW FROM TIMESTEP - PROSAT FOR WINDOWS

James Brown

First a seasonable story! It was Christmas day 1990 when I received Timestep's PCSat-3 card and software for displaying weather satellite images. In those days some of us still clung to our frame stores for grim death but with the arrival of computer processing, the writing was on the screen! Over the years that basic product has been enhanced and modified into the ubiquitous PROsat, a stable platform for image reception and processing, now with full colour animation and gridding. Now its coming up to Christmas 1995 and, just when you thought your wallets were safe, Timestep have unveiled their latest creation - PROsat for Windows. If I find it hard to be modest with my praise for this new product, then you'll have to excuse me, for there is little to be modest about! Rather, I think you'd better prepare a soft landing zone for your jaw as we whip through the specification of this new arrival, for this is no straight port of the original beast into the Windows environment! This is New PROsat for New RIG..... Please bear in mind also that I haven't just lifted these figures from manufacturers' hype or they're wishful thinking, but they are my own findings as I have been extensively testing the product.

* Sampling now at 4800 kHz (1200 pixels per line for geostationary, 2400 for polar orbiters)
* Internal card using a com port and on-board fast buffer
* Multiple polar and geostationary windows
* Mix Polar and geostationary images on screen at the same time
* Background operation
* Windows version of Sat Track II
* Combine Satellite Tracking window with live ingest of satellite data
* Multiple Palettes - even change palette on the fly whilst receiving!
* Direct export as Windows .BMP files
* Mix Animations with other image Windows
* Automatic decoding of Meteosat header information, and automatic allocation of correct palette and/or animation
* Automatic channel selection of Timestep's Geostationary Receiver
* Automatic channel and time control of Timestep's PROsat receiver for unattended scheduling
* Hard copy via standard Windows Printers

And these are only some of the new features....There are more!

Whilst I am typing this review using Word Perfect for Windows, I have a small screen in the top left hand corner showing the latest GOES-8 image coming in. I could have chosen to have the tracking screen as well if I had wanted and a gentle chime would have told me of the presence of a satellite coming over the horizon... Or I could have

closed down the active windows and continued reception in background mode. - How's the jaw?!

For a while now, Timestep have been releasing an external version of this system at a considerably higher price to the education market, (also useful for laptop users) but this is a brand new internal version which thankfully, though considerably cutting the cost, cuts none of the corners.

Let's move on then from this overview to a deeper look at what you get for you money.

The card is a 16 bit ISA internal job with a D-socket to the outside world for the various receiver inputs and control lines and a jack socket for a speaker. Three pots á la DOS PROsat control the input levels to the geostationary and polar inputs and also the output to a speaker. Two jumpers on the board configure the unit to use any free com port from 1-4 and you have a choice of using the default IRQs associated with these

ports, or customising them. Probably, like many other RIG members, I already have a mouse on COM 1 and a modem on COM 2, so I configured it for minimum conflict problems; COM 4 using the default IRQ 3 plus the address of 2E8H. This I notified in the Windows control Panel and then installed the software and configured it to match the above. There is a 'dongle', which is a pass-through key protection device sitting on the parallel port. I have a modern ECP port and unless the printer is powered up, the dongle reports an initial 'device key not recognised' when you try to run the software but a click on retry is all that is required. Software installation appears to be painless and flawless, via the usual selection of install from Programme Manager's RUN command.

Lurking beneath the innocent Timestep Icon are two further Icons inviting you to run the Tracking programme, which is really an enhanced port of Track II - (more of that later) or the main satellite reception window. With them both in operation you can't escape the feel that you are in the control room at NASA, and the precision timing with which the warning chime of the tracking software coincides with the first bleeps of the satellite coming over the horizon has to be seen to be believed.

Gone are the set-up screens, for this is a fully engineered Windows product, and the resolution in which you run Windows is the resolution you see on the screen. You can run the familiar Level setting programme from the receive menu but tweaking the pots with the picture on screen is without doubt the best method. A swift click or two on the pull-down menus and a largish, but fully re-sizeable, Window opens up and on the reception of valid data, the picture begins to build up on the screen. What a picture! At the new, doubled (with respect to DOS PROsat) sampling rate, one of the pictures of Meteor 3-5 overhead near Greenland would pass muster as HRPT to all but the most trained of eyes! Don't just take my word for it - look at the image reproduced here for yourself. Take the test - can you tell PROsat from HRPT? NOAA images look cleaner and for Okean and Sich1 there is a clear and significant improvement gained by moving to 4800 sampling. There is none of the 'ringing' to be found on some systems due largely, I imagine, to a 4-pole Bessel post detection filter, followed by a two-pole Chebyshev job. These give a low-noise, sharp response time.

Once you've received your image there are a host of options open to you. If its a NOAA or Meteor then you can load elements from the satellite tracking programme and add gridding, though with my set up there is an inexplicable reluctance to draw the lines with Meteors. You can also set up your own town or village as a marker and have it displayed on the screen as an X which marks the spot. Very useful if you're under a bank of cloud or looking at a night-time pass. Timestep have gone one step further with the ability to add coastlines and political boundaries. This latter process takes more time and is more sensitive to orbital perturbations and deviations from the Keplers or PC clock errors. The best I can get it to is to within about 10 miles accuracy which, for all events and purposes, seems to me to be entirely adequate though diffi-

cult to maintain. Unfortunately, if you zoom in or out from the screen on which the outline occurs, the gridding is replaced at the new resolution but the outline has to be recalculated all over again. On my present machine configuration, (see later) it takes about 15 seconds for an initial outline and 90 seconds for a full calculation.

A small floating window can be opened to display a choice of parameters measured at the mouse pointer. They are geographic co-ordinates, pixel value and, in the case of a NOAA infrared image, the temperature.

Those Russian insomniacs insist on doing so many of their interesting Okean transmissions during the early hours of the morning when only the most dedicated of us would leap out of bed. Fret not because it is the easiest of things to set up a schedule for the night-time passes and put the programme into auto-save mode. This will do two things. If you have a PROscan receiver the Data I/O feature of the card will automatically select the correct channel as the required time draws near and then, when the squelch lifts, the picture will be acquired and saved while we continue to sleep!

The famous Timestep set-colours (you either love it or loathe it!) has given way to a very sophisticated histogram display with the ability to set markers with mouse clicks and drag them up and down to achieve the desired result. I have found the GOES-8 visible images, normally so difficult to resolve in terms of land/sea differentiation, now yield excellent results with a customised palette. A coloured auto-set palette is available and a basic equalise command is available from the menu. Also, it is possible, by drawing a temporary 'lasso' around any area of the image and then selecting equalise, to do a stretch on that area. There are also preset palettes supplied which, remarkably, can be applied or changed whilst the image is being received and which will be more than adequate for many users. Edge-enhancement and median and softening filters are also available as is the option to generate pseudo-3D imagery.

The animation part of the package is fully integrated and has a host of extras. If you use Timestep's own bijou Meteosat/GOES receiver, size about 4" x 4" (Metric free zone here!), you're in danger of becoming a real couch potato. It is fully controllable from the programme and you can therefore have, say, a DTOT animation scheduled in one corner and channel-2 images building in another, or have a D2 animation in one area and a C02 running in another. The binary decoding, together with the channel switching, ensure that the right image gets inserted into the right window - clever that! You can also choose one of the excellent 'trick' palettes where coloured overlays are used to differentiate land from sea. Several options are available and they are superb at revealing the maximum image information whilst giving you a clear sense of land/sea differentiation. Or you could choose to just have grey-scale images. By the nature of things simultaneous reception of geostationary and polar data is not possible.

For dyed in the wool DOS addicts, it will take you a while to re-orientate your use of controls. Gone are the friendly click and zoom or drag boxes and you need to use a pull-down menu to zoom in or out and then use the drag bars to centre the image. This programme also runs in Windows '95 for those who have downgraded to this version.....! This Windows compatibility does reap a number of extra benefits. You can send your active screen to whatever printer you have linked up and, having recently fallen in love with an Epson Stylus Color, I was able to produce some remarkable coloured infra-red images with the greatest of ease. Alternatively, you can use any other Windows screen capture programme, such as the one used to produce the colour print on the inside front cover. You can also save .BMP sections and, with Windows multitasking, switch instantly to your favourite graphics programme for any further processing you may wish to perform.

The Windows version of the successful Track II has virtually everything you could want of a basic tracking programme. I'm afraid I was one of those early aficionados of PROsat and in those days TRACK II was an optional extra, so I have not used the programme until now. Having tried a good half-dozen or so alternatives, I am more than content with Timestep's programme. No, there isn't the choice of sophisticated map projections as in programmes like Instant Track or the latest STL-Plus but neither of these has six satellites together with their foot-prints on screen at the same time. I happen to like seeing my birds flying in flock formation either in real time or, by clicking on the increase/decrease boxes, I can see them swiftly migrate and check on their position. Elements can be updated automatically from files of elements, or manually if required which is useful when a new bird is spotted. Schedules can be seen and printed, and a host of preferences and options can be set relating to the displaying of ground-tracks, rise/set sounds etc.

No self-respecting programme comes these days without a health warning as to the minimum requirements needed to run it. Windows '95, for example, won't really get out of bed for less than a DX2-66 and 8 Mb of RAM. So you need to bear in mind three factors before you leap out and dial Timestep's number. Firstly, with the amount of number crunching needed in the graphics and calculating department, you really need a DX2-66 processor as a bare minimum but with clock-tripled DX4-100s obtainable for a tad over a hundred pounds, that's not asking so much. Timestep's blurb says a 486SX with 4 Mb of RAM is a minimum and, whilst I don't dispute that, I think you'll be disappointed if you don't think bigger. PROsat for Windows is a modern product and you really need a modern set up to drive it. Secondly, whilst 4 Mb of RAM will buy you a good basic working environment, bear in mind that double sampling = double storage space; both in terms of dynamic memory and disk space. A good NOAA pass could take almost 5 Mb off your system's resources straight away and you'll already have taken up a fair few Mb running Windows and the Timestep programme. Opening an animation on top of this will involve Windows in using a swap file on your hard disk and everything will slow down to a crawl. Its not impos-

sible but if the read/writes are a bit slow there's a danger you'll lose sync as the processor fails to read incoming data in time. The programme is so well behaved that the worst that could happen is that part of the incoming image may get shifted out of synchronisation. With 16 Mb of RAM the thing darn near purrs, with the hard drive light only coming on when you save. Lastly, most modern graphics cards turn in a respectable speed, even the more humble ones, and fast writes to the screen buffers would again prevent a bottleneck for the processor, and give faster graphic screen updates. During the five or six weeks of testing I have only had one GPF error and its cause has already been tracked down and corrected. As a benchmark, my own computer is a standard 486DX-2 66 clone with a Hercules Dynamite Power 2Mb graphics card, and 16Mb of RAM (Yes, I do a lot of DTP in my work!).

One area of concern to some might be the need to alter the signal input levels, when selecting the polar orbiters. There is a slight difference between Meteors and NOAAs but a much greater problem when it comes to the Okeans. The modulation of Okean 4 is much less than the NOAAs but not as poor as Sich 1. My own remedy, as with the DOS version, has been to feed the signals to the card via ten-turn pots, which allow for precision repeatable results. You also need to be aware that there is power going out from the computer via the card which means that, if you power the receiver from the card, you won't be able to use it to monitor transmissions with the computer off. If you use the PROscan receiver, a further problem is that when the DATA cable is connected and the computer is off, the tri-state buffers on the card return to zero and that locks the receiver at channel A. For many, this won't be a worry as they perhaps lean towards a 'turnkey' approach. However' there are simple solutions to these problems, and Timestep are in the process of supplying add-on units with external controls for those who want to go beyond the NOAAs and Meteors in their polar orbiter reception.

Now for the bit you've all been waiting for - the manual! What can I say! Its larger, far more comprehensive and, as this is truly a Windows programme, it comes complete with on-line HELP! There were still a few gaps in the first manual I saw but it is adequate, and you'll get a lot more than I have seen in the initial version. If I had written the manual then I guess it would have been a couple of inches thick in order to do justice to the programme. With time and patience even the most obscure parts of the programme will yield to your probing rodent. In a review of this length I have not been able to cover every aspect of the programmes but, hopefully, you now have some idea of its ability.

The really good news is that Timestep have kept to their track record of announcing products only when they are available and working (Are you receiving me Bill Gates?). Although the product is ready for shipping for customers now, Timestep seem to have a number of enhancements and updates planned. Already, work has been completed on providing temperature calibration for Meteosat images, and plans are afoot for

temperature slice palettes for their animations which will be adjustable on the fly, much as PDUS users have become accustomed to.

Well there you have it! I believe in praise where praise is due and in my opinion this is a product truly worthy of an accolade and likely to be the standard by which others are judged for some time to come. So now you know what you're going to get, will the Bank Manager agree, or will she throw a wobbly? For a brand new user I understand the initial price has been set at £164.00 plus carriage of £6 and the dreaded VAT, making a total of £199.75 for the card and software. If you need any cables or the external level control unit then they'll be extra. I gather also that there is to be a special upgrade price for those who want to move from their previous DOS version. You alone can judge whether you are getting value for money but the odds are that at this price there'll be a lot of double-glazed Weather Windows this Winter! ⊕

RIG REGIONAL GROUPS

I hope you will remember that in journal 40 I raised the issue of regional group meetings. With UK membership running at about 1500 there appears to be enough people to support and benefit from regional meetings and I am very pleased that two are being established. One is on the Isle of Wight (the contact is Mr AF Bareham, 01983 531481) and the other is in Bristol (contact: Mr Marcus Foreman, 0117 956 6479). My understanding is that members in these two areas have been informed about their planned local meetings.

There are so many fast-moving developments in our hobby; new software, new hardware, information about satellites, that it is hard to keep up to date. Regular local meetings, as well as being sociable, are a way of keeping abreast of developments and news. I feel there is plenty of scope for more regional groups but its up to you to organise them! Your committee will give support to initiatives. We will provide a list of local members and money for the first mailshot to that group. In the longer term we will have to develop a policy about how regional groups can be supported by the main committee. In the meantime, regional action please.

FJ Bell.

[John Boyer wishes to ascertain the amount of interest in forming a regional group in the Redhill/Crawley area. The venue will depend on the interest shown and the numbers likely to attend the informal, inaugural meeting which is planned for Saturday, 3 February. If you are interested, then please contact John on 01293 776862 between 7.00 and 9.00pm but not on Tuesdays or Wednesdays. Ed.] ⊕

A JVFAX SYNCHRONOUS AM INTERFACE MK II.

Greg Jameson

A slight problem with the previous version of my AM interface (RIG 42 p45) is that on decoding a signal from a recorder which has some noise associated with it, the PLL may momentarily lose its lock with the 2.4kHz carrier and so cause the displayed image to shift to one side.

The solution to this is to record the satellite signal on one channel of a stereo tape deck while on the other simultaneously record a stable reference carrier derived from a crystal oscillator. This means that there is always a nice clean carrier for the PLL to lock on to on play-back and as a consequence, more consistent results are obtained even with noisy parts of a picture. As before, the circuit will also work with live data.

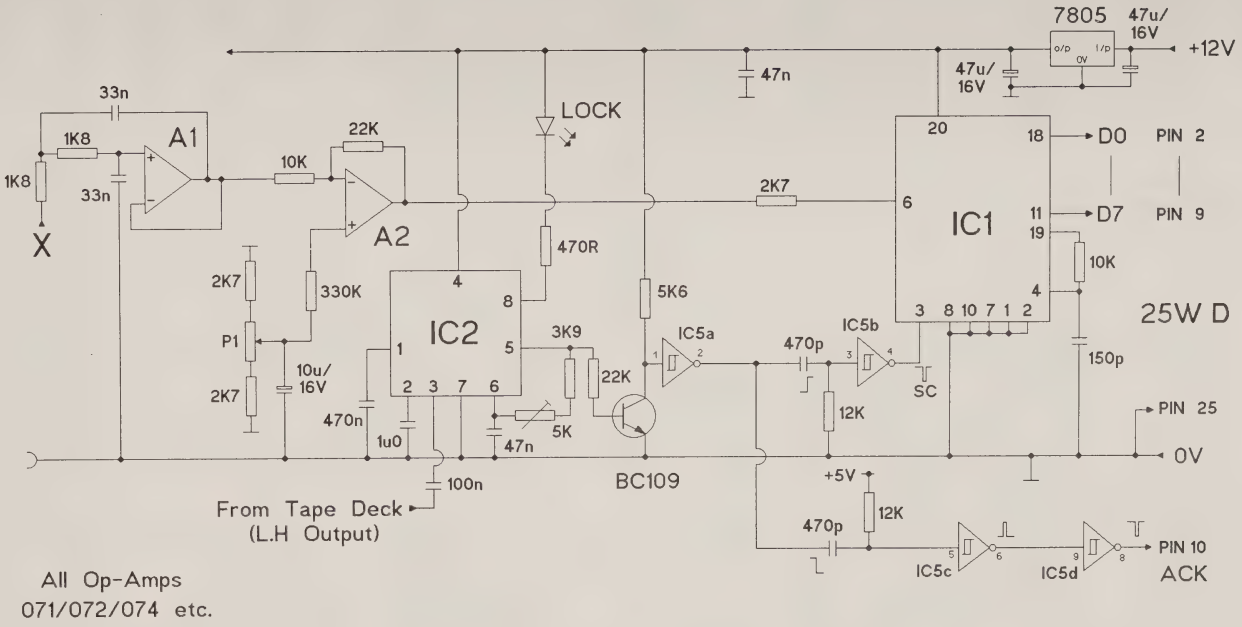
The ADC and detector sections of the circuit are essentially the same as the previous design and so I won't describe them here. IC4 forms a crystal oscillator/buffer whose output should be trimmed to 1.8432MHz. IC3 divides this frequency by 64 and IC8 by a further 6 to give 4800Hz. This may seem an odd way of obtaining 4800Hz as you could do it using a 2.4576MHz crystal and IC3 alone. However, the 56th harmonic of 2.4576MHz is 137.62MHz! Need I say more? IC7c forms a band pass filter which has the effect of turning the square wave at its input into an approximate sinewave at its output. This is are stable reference frequency which is fed via a pot to one of the REC inputs of the tape deck. On play-back, this signal is fed into the PLL IC2, which will then follow any variations in the speed of the tape. Note that the free running frequency of IC2 is now 4800Hz and not 2400Hz as before.

A suitable I/O card that can be configured for bi-directional data flow via its printer port is the one with the Winbond chipset Stock No 40-04832 supplied by Cirkit at £10.95. ⊕

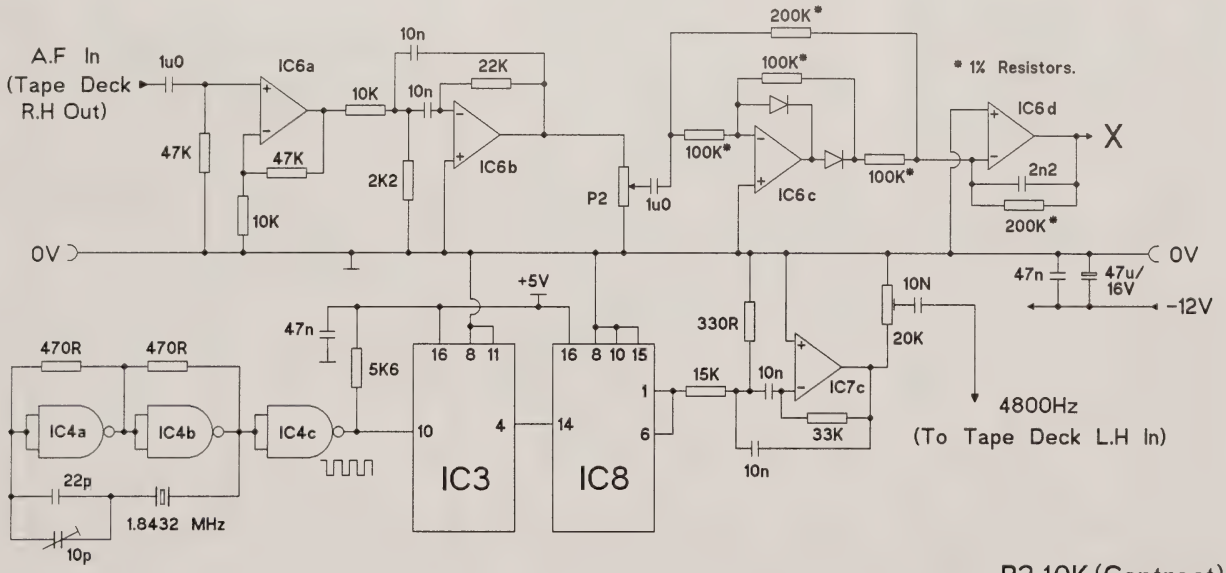
REGISTRATION OF METEOROLOGICAL SATELLITE DATA USERS

Members may recall that, some time ago, the RIG membership list was passed (with members' permission) to the World Meteorological Organisation for the purpose of international registration of meteorological satellite data users. This action more than trebled the number of users worldwide known to the WMO! With membership now over 2000 the WMO has requested an updated membership list.

Therefore if any members (other than those who have already requested 'no publicity' and those few whose particulars are not held on computer) prefer not to have their names passed to the WMO for registration purposes only please let me know by 'phone or letter by mid December. Thank you. John Tellick. ⊕



JVFAX Synchronous A.M Interface MK II.



P2 10K (Contrast)

+-12V derived from
7812,7912's

	+12V	-12V	+5V	0V	
074	4		11		
HC14			14	7	Pins
LS00			14	7	

IC3 4020
IC4 74LS00
IC8 4018

A LOW COST RF SYNTHESISER FOR WEATHER SATELLITE RECEIVERS

WG Sneddon

There is an unfortunate tendency nowadays to believe that all circuits must be designed around the latest "single chip solution" ICs in order to be viable but this is not always the case.

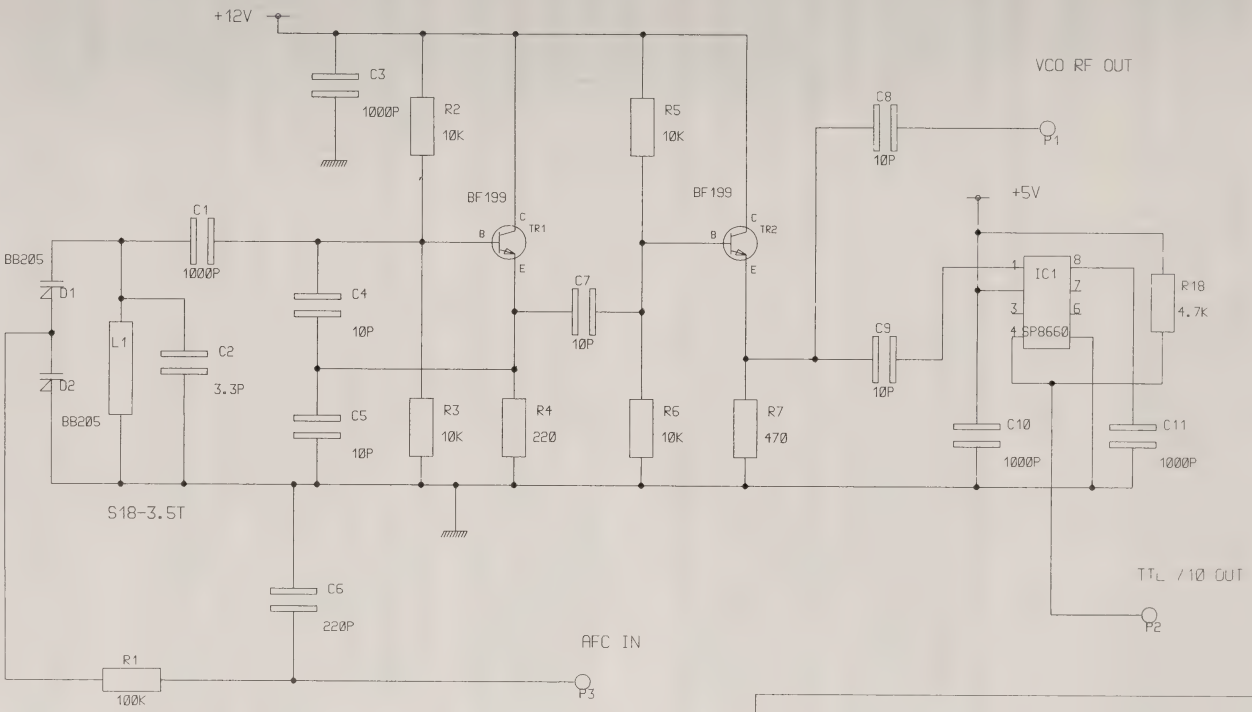
When a requirement arose for a synthesiser to provide the local oscillator in a wideband monitor receiver, I decided to see what could be done with my thirty-odd year collection of junk-box components. The original version of the synthesiser described was built on Veroboard and used 10 ICs plus an ECL prescaler of such an age that Plessey did not recognise it as one of theirs when I enquired about a modern replacement. Performance of the unit was excellent and it was used in conjunction with a home-brew design and also a much modified Cirkit Mk 1 receiver for some time. It was also tried with a recently built RIG Rx1 receiver with equally good results which provided the incentive to carry out the updating and write this article.

The Mk 2 version described here is a conventional single loop synthesiser using a low cost, TTL compatible, single modulus prescaler, Plessey type SP8660, which is fairly easily obtainable. The remaining ICs are standard TTL or CMOS items. My version uses standard TTL which results in a heavier power requirement and the use of 74LS series is suggested where possible.

The drawbacks of this design are twofold; firstly the physical size and secondly, the programming is binary rather than decimal. This was not a problem for the original application, which used a separate counter/keypad arrangement to scan and select channels, but does not readily permit direct switch connection. The simple diode matrix switching arrangement has been tried and is satisfactory for the normal weather satellite frequencies. These drawbacks are largely offset by the low cost and even buying all new components the outlay would be quite small compared with a dedicated integrated circuit solution. Due to the wide band requirements of the original design it was found that with proper programming and a small tweak of the coil slug, the output would go up to 137.5MHz and could be used as a stable and accurate signal source for test and alignment.

Circuit Description

The design objective for this version was to cover the range 124 to 128MHz in 10kHz steps for use as a receiver local oscillator utilising a 10.7MHz IF. Using a single modulus prescaler requires that the reference (step) frequency is also divided by the modulus factor, ie 10 in this case, giving a reference frequency of 1kHz and min/max division ratios for weather satellite band operation of 12530 for 136MHz and 12730 for 138MHz. The voltage controlled oscillator is a conventional Colpitts arrangement



RF SYNTHESIZER MK 2 FOR
WEATHER SATELLITE RECEIVER
PAGE 1 - VCO AND PRESCALER

(C) 1995 W.G. SNEDDON.

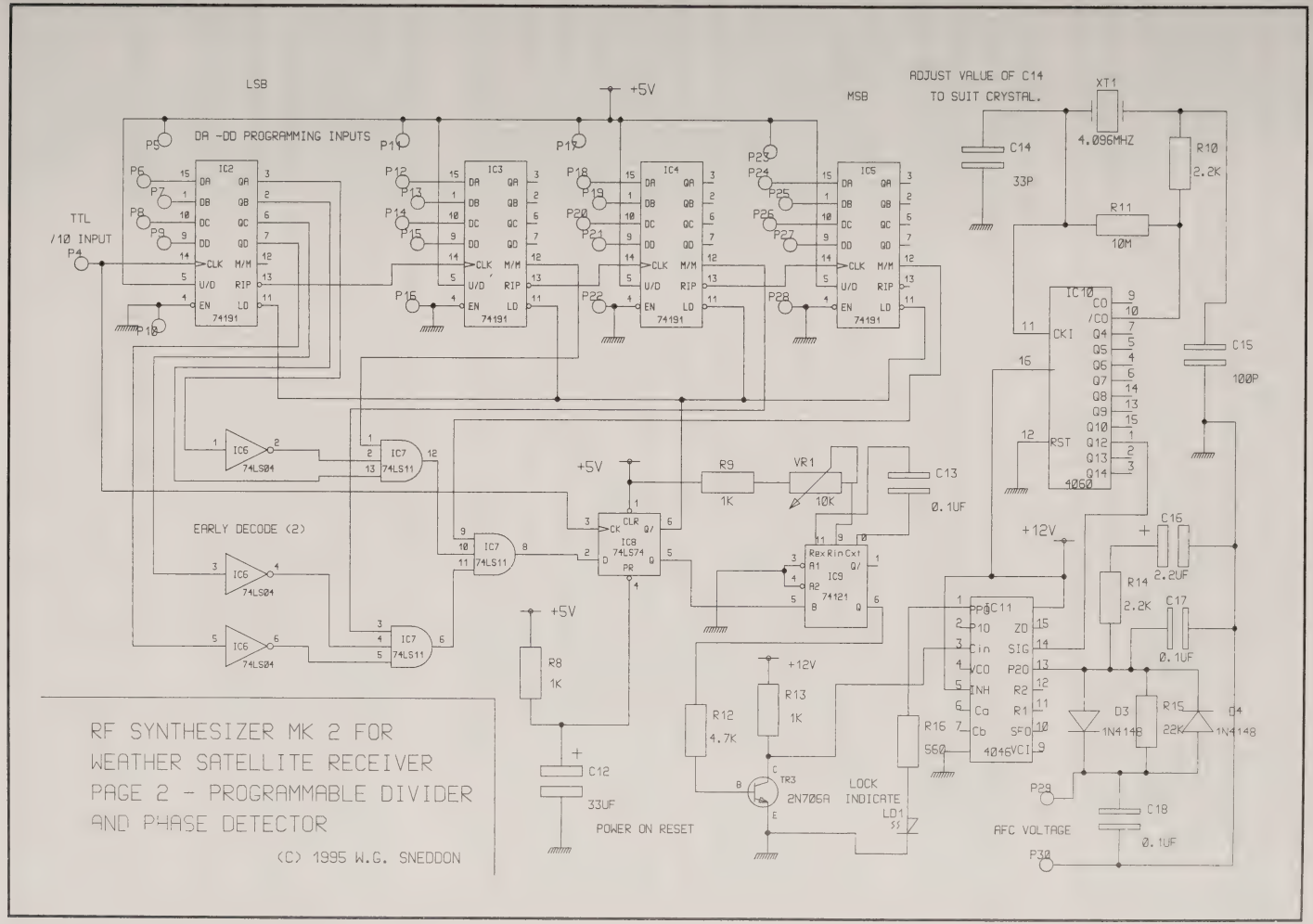
with two varicap diodes back-to-back for tuning and it covers a range of around 114 to 135MHz. An emitter follower provides some buffering of the output which also feeds the divide-by-ten prescaler, giving an output in the 11 to 14MHz range to the main dividers. Using the specified BF199 transistor the output level is approximately 300mV. A 2N2369A transistor will also work here but gives a lower output level.

Dividers IC2 to IC4 are programmable binary counters arranged to count down from a preset number at the data inputs DA to DD on each stage and clocked by the 11 to 14MHz from the prescaler. Early decoding of the count status is achieved by ICs 6 and 7, presetting the D input of IC8 when the countdown reaches 2. On the count reaching 1, IC8 changes state and reloads the preset number into the counter to start the cycle again and additionally provides an output pulse to the monostable IC9. The purpose of this monostable is merely to broaden an otherwise very narrow pulse and VR1 is adjusted to give an approximately equal mark/space ratio.

The original objective was to have a wide frequency swing available and for this reason the phase detector IC11 was run from a 12V supply, as was the reference oscillator. Level translation of IC9 output is achieved by TR3 which in the prototype was a 2N706A but most general purpose transistors will serve here. IC11 is a CMOS phase-locked-loop chip containing two phase comparators and other components; in this design only comparator No. 2 is used. (Strictly speaking, the use of this edge-triggered comparator would render the monostable IC9 unnecessary but I wanted to use comparator No. 1 output for front end tuning in the receiver.) Input to the comparator is a 1kHz square wave from the divider via IC9/TR13. The output from comparator No.2 is filtered and smoothed by the network R14/R15/C16/17/18 and applied as a frequency adjustment voltage to varicaps D1 and D2, thus completing the loop. Diodes D3 and D4 permit rapid adjustment of the loop conditions in response to large step changes in frequency selection. An output is available from pin 1 which will drive a low current LED to indicate the locked condition of the loop.

Reference input to the comparator is provided by a CMOS crystal oscillator and divider chain from IC10. I used a 4.096MHz crystal and took the output from pin 1 but various combinations of crystal frequency and division ratio can be used as long as the resultant output is 1kHz.

As previously mentioned, control of my original version was by a separate counter chain and keypad which was from another project and used some obsolete components so was not considered for publication. A simple diode matrix arrangement was tried instead and worked satisfactorily for selecting the commonly used channels. It was found that with lead lengths of more than 25mm connected to the programming inputs, the divider would go unstable due to pickup and to cure this 220pF capacitors were wired across the eight input pins of the relevant ICs. The remaining pins, being hard wired, were not treated in this fashion. A six-position switch connects points


LSB
MSB
+5V
ADJUST VALUE OF C14
TO SUIT CRYSTAL.
DA -DD PROGRAMMING INPUTS
TTL
/10 INPUT
P4
P5
P11
P17
P23
IC2
IC3
IC4
IC5
74191
XT1
4.096MHZ
C14
33P
R10
2.2K
R11
10M
IC10
4060
C15
100P
EARLY DECODE (2)
IC6
74LS04
IC7
74LS11
IC8
74LS74
IC9
74121
R9
1K
VR1
10K
C13
0.1UF
+12V
C15
2.2UF
R14
2.2K
C17
0.1UF
IC11
4046
R8
1K
R12
4.7K
R13
1K
TR3
2N706A
R16
560
LOCK
INDICATE
LD1
D3
1N4148
D4
1N4148
R15
22K
C12
33UF
POWER ON RESET
C18
0.1UF
AFC VOLTAGE
P29
P30
RF SYNTHESIZER MK 2 FOR
WEATHER SATELLITE RECEIVER
PAGE 2 - PROGRAMMABLE DIVIDER
AND PHASE DETECTOR
(C) 1995 W.G. SNEDDON

P41 through P46 to the +5V rail as required.

Setting Up

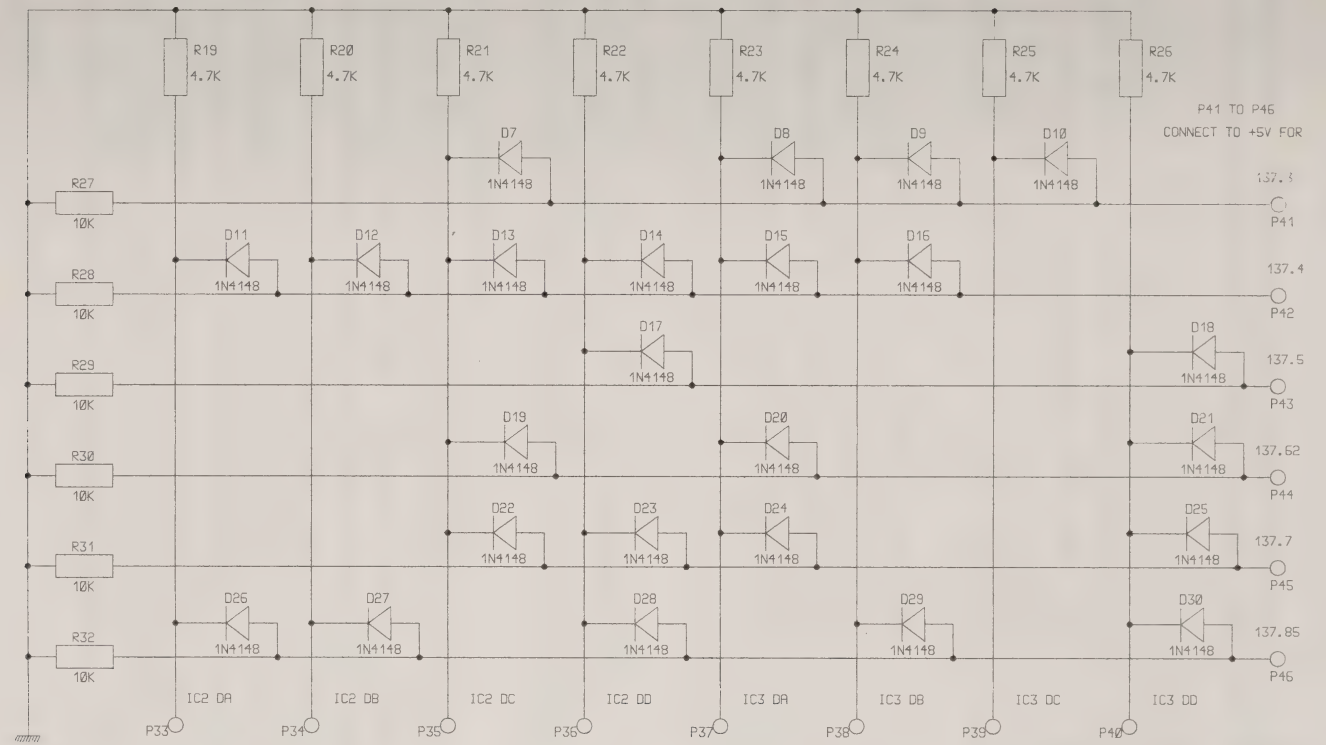
Setting up the unit is fairly simple if the following procedure is followed but it does require the use of a good oscilloscope and a frequency counter capable of operating at 140MHz. After the usual thorough check for dry joints and shorted tracks etc, break the afc loop so that the junction of C6/R1 can be temporarily strapped to +5V. Connect the counter to the RF Out point and apply power. Set L1 core so that the counter indicates approximately 126.8MHz. Preferably hard wire the programming inputs for division by 12680, or switch the diode matrix to the 137.5 select position and check with the 'scope at IC8 pin 5 for a positive pulse. This is difficult to see, being about 80ns wide and repeated at 1ms intervals. If the 1ms interval is approximately correct and appears stable, then the divider is operating correctly. If appreciable jitter is present, then either there is pickup present on the programming inputs or there is a wiring fault. It could be mixed up programming lines, missing preload pulse or clock pulse etc. and must be resolved.

Check also that the reference frequency output at IC10 pin 1 is present; it should be a 1kHz square wave of 12V amplitude. It may be found necessary after the unit is fully working to trim the reference frequency, and therefore the output frequency, by altering the value of C14.

With the 'scope connected to IC9 pin 6 set VR1 to give an approximately equal mark/space ratio and check that this and the reference frequency appear at IC11 pins 3 and 14. The junction of R1/C6 can now be disconnected from the 5V rail and reconnected to the comparator output. If all is well the lock indicate LED will illuminate. With a 'scope (DC input) connected to R1/C6 junction, the DC level will be between 5 and 6 volts; by adjustment of the coil core this will rise or fall. The limits of lock range should be determined and the core adjusted to half this value.

Although built on Veroboard with inevitably long path lengths the system has proved to be very stable and remarkably tolerant to the changes made to update the design. Few people nowadays would have the patience or inclination to sit down with a piece of Veroboard and build something of this nature. They would only be interested if a PCB or kit of parts was available. A printed board was designed for this circuit but not made as my prototype worked so well. The design has therefore not been proven but if there is sufficient interest I could probably get a batch of boards made.

It has been an interesting exercise to update the unit to use more readily available components and I hope that fellow RIG members will find this article of interest. ⊕



IC4 DA AND IC5 DA, DB ARE HARD WIRED TO +5V

IC4 DB,DC,DD AND IC5 DC,DD ARE HARD WIRED TO ØV

APPLIES TO 74191 VERSION ONLY

RF SYNTHESIZER MK 2 FOR
WEATHER SATELLITE RECEIVER
PAGE 3 - CHANNEL SELECTION MATRIX
(74191 VERSION) (C) 1995 W.G. SNEDDON

THE METEOSAT SYSTEM - PART 2

MTP HAS ITS FEET FIRMLY ON THE GROUND
EUMETSAT

[The first part of this in-depth look at the Meteosat system appeared in the December 1994 issue. Now seems an appropriate time to look at the next stage of development as the transition to the second generation of Meteosat spacecraft gets under way. The following is taken from the second issue of EUMETSAT's new publication *Image*, dated February 1995. - Ed]

The results of many years hard work are becoming apparent in Darmstadt, with the integration of EUMETSAT ground facilities in full swing in the new Headquarters building, in preparation for the commencement of mission and satellite operations in December 1995.

The "state of the art" facilities are being developed as part of the Meteosat Transition Programme (MTP). The MTP will ensure continuity in operations between the end of the Meteosat Operational Programme (MOP) on 30 November this year and the start of Meteosat Second Generation (MSG) operations at the end of the year 2000.

On completion of ground segment integration and operational preparation, EUMETSAT will be ready to take over full control of the existing MOP spacecraft from the European Space Agency's Operations Centre (ESOC).

There are four main elements of the EUMETSAT ground segment:

Core Facility (CF)
Meteorological Products Extraction Facility (MPEF)
Meteorological Archive and Retrieval Facility (MARF)
Primary Ground Station (PGS)

The CF, which is being developed by Thomson CSF of France, is the central part of the ground system and includes mission management, satellite and ground segment control, processing of all image and other data received from the Meteosat satellites and dissemination of the processed data.

The MPEF, developed by Logica (UK), will provide meteorological products such as wind speed, wind direction and temperatures of ocean surfaces. These products will be derived from the CF-processed data and will be distributed with the Meteosat images to the national meteorological services for use in weather forecasting and research.

In the MARF, the Meteosat image data and products will be stored on optical discs. A

computer based system will enable external users to directly order and retrieve data from the archive. The MARF is being developed by CRI of Denmark.

The PGS is located in Fucino in Italy and its purpose is to relay control information and data to and from the Meteosat satellites. It is connected by high speed data links to the EUMETSAT control centre in Darmstadt. The PGS is being constructed by the Italian company, Telespazio.

These ground segment elements are complemented by existing facilities in Lannion (France) for the relay of images from other satellites, uplink for the Meteorological Data Distribution system in Rome (Italy), Bracknell (UK) and Toulouse (France) and a back-up ground station in Weilheim (Germany).

The new ground segment takes full advantage of modern technology and makes extensive use of distributed processing, using workstations rather than main-frame computers. This results in a lower manning requirement and significantly reduced operating costs. When considering together the cost of development and the reduced operating overheads, there is a significant saving in converting to the EUMETSAT ground segment. If, as is likely, the operational period is extended, these cost savings will be even more pronounced.

In addition to the improved cost-effectiveness, the development of the new ground segment will also bring other benefits including the capability of real-time data rectification and fast dissemination of images, quicker generation and increased frequency of meteorological products.

As well as development and operations of the new ground segment, the MTP also includes the construction and launch of the Meteosat-7 satellite. This satellite is currently being assembled by Aerospatiale in Cannes, France and will be launched by EUMETSAT at a convenient time after mid-1996.

The Meteosat Transition Programme is managed by Dr. Anthony Harrison who is also responsible for the MSG programme. Supporting him in Darmstadt is a team of more than 40 EUMETSAT staff and consultants who are managing the external contracts and are working on the many complex interfaces, communications aspects, integration and testing of hardware and software. ⊕

FOR SALE. BBC Master Computer complete with: dual D/Drive, various ROM based software, RX8 multimode decode package(RTTY, SSTV, FAX, Morse, ARQ). Martelec MSG20 Framestore with dedicated Grace software gives 500 x 500 x 128 images NOAA APT or Meteosat. Panasonic KX-P1180 printer with spare ribbons. All fully documented and in good condition. Can deliver within reasonable distance. Offers for the lot. Paul, 01253 826535 (Blackpool)

PREDICTED TIMES FOR AQUISITION OF SIGNAL FOR 52.5 DEG NORTH, ZERO DEG EAST

	NOAA 12 Period 101.28 mins 137.50MHz			NOAA 14 Period 102.07 mins 137.62MHz			OKEAN 4 Period 97.75 mins 137.40MHz			SICH 1 Period 97.79 mins 137.40MHz		
	S'bound		N'bound	S'bound		N'bound	N'bound		S'bound	S'bound		N'bound
10 Dec	0612	0752	1740 1921	0122	0303	1116 1256	1034	1214	2041 2219	0500	0638	1921 2059
11	0730	0911	1718 1858	0111	0252	1244 1426	0924	1100	1928 2107	0527	0705	1948 2127
12	0709	0849	1658 1836	0101	0241	1233 1415	0949	1128	1955 2134	0554	0733	1838 2015
13	0647	0827	1636 1814	0230	0412	1222 1404	0839	1014	2022 2200	0443	0621	1903 2042
14	0627	0805	1753 1934	0219	0401	1212 1353	0905	1041	1910 2048	0510	0648	1754 1930
15	0605	0743	1731 1912	0208	0349	1202 1342	0931	1109	1936 2115	0537	0716	1821 1958
16	0722	0903	1710 1850	0158	0339	1151 1332	0956	1137	2003 2141	0426	0604	1846 2025
17	0700	0840	1649 1827	0147	0329	1141 1320	0845	1023	1851 2030	0452	0631	1913 2053
18	0638	0818	1627 1806	0135	0316	1129 1309	0912	1050	1917 2056	0521	0658	1803 1941
19	0616	0756	1744 1925	0125	0306	1119 1258	0938	1118	1944 2123	0409	0546	1829 2008
20	0734	0916	1723 1903	0113	0255	1108 1247	0827	1005	1833 2011	0436	0614	1718 1856
21	0713	0853	1701 1840	0102	0244	1236 1418	0853	1032	1859 2038	0325	0502	1745 1923
22	0651	0831	1639 1818	0233	0414	1225 1406	0741	0919	1925 2104	0351	0530	1811 1950
23	0629	0809	1757 1938	0223	0404	1215 1356	0808	0946	1813 1951	0419	0557	1659 1837
24	0608	0747	1736 1916	0211	0353	1204 1345	0834	1013	1840 2018	0307	0445	1728 1906
25	0726	0906	1713 1853	0201	0342	1154 1335	0722	0900	1728 1906	0334	0513	1755 1934
26	0704	0844	1652 1831	0149	0331	1143 1323	0749	0927	1754 1933	0401	0540	1643 1821
27	0642	0822	1631 1810	0139	0319	1133 1312	0816	0953	1821 2000	0250	0427	1710 1849
28	0621	0800	1748 1929	0128	0309	1121 1301	0703	0841	1710 1848	0317	0455	1601 1738
29	0738	0919	1726 1907	0117	0258	1111 1250	0730	0908	1736 1915	0345	0523	1627 1804
30	0717	0857	1705 1844	0107	0247	1239 1421	0620	0756	1802 1941	0233	0410	1653 1832
31	0655	0835	1644 1822	0055	0236	1228 1410	0746	0823	1651 1829	0300	0438	1543 1720

	NOAA 12				NOAA 14				OKEAN 4				SICH 1			
	S'bound		N'bound		S'bound		N'bound		N'bound		S'bound		S'bound		N'bound	
01 Jan	0634	0813	1800	1942	0226	0407	1218	1359	0711	0849	1717	1856	0327	0506	1609	1748
02	0611	0751	1739	1920	0215	0356	1207	1348	0601	0737	1744	1922	0216	0354	1639	1814
03	0729	0910	1717	1858	0204	0345	1156	1337	0627	0804	1632	1810	0243	0421	1703	1843
04	0707	0849	1656	1836	0153	0734	1146	1326	0652	0831	1658	1837	0310	0448	1553	1731
05	0647	0827	1635	1814	0142	0323	1135	1315	0543	0718	1725	1903	0159	0336	1618	1758
06	0624	0804	1752	1933	0131	0313	1124	1304	0609	0745	1613	1751	0226	0404	1646	1826
07	0742	0923	1730	1911	0120	0301	1114	1253	0633	0812	1639	1818	0251	0431	1535	1713
08	0720	0901	1709	1849	0110	0250	1242	1425	0659	0839	1706	1844	0141	0319	1602	1741
09	0659	0839	1648	1826	0100	0239	1231	1413	0549	0726	1554	1732	0208	0346	1451	1629
10	0637	0817	1626	1804	0048	0228	1221	1403	0615	0752	1620	1759	0057	0234	1517	1656
11	0616	0755	1743	1924	0218	0400	1211	1351	0503	0641	1647	1826	0125	0302	1545	1723
12	0733	0914	1721	1902	0207	0349	1159	1340	0529	0708	1536	1713	0149	0330	1432	1610
13	0712	0852	1700	1839	0156	0338	1149	1329	0556	0734	1603	1741	0040	0217	1500	1638
14	0651	0830	1639	1818	0144	0326	1138	1318	0443	0621	1447	1628	0107	0245	1527	1706
15	0629	0808	1756	1937	0134	0315	1128	1307	0511	0648	1517	1655	0133	0312	1417	1554
16	0747	0927	1734	1914	0124	0304	1117	1256	0537	0716	1543	1722	0021	0200	1443	1621
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18	0702	0843	1652	1831	0102	0243	1234	1417	0452	0629	1458	1636	0116	0255	1359	1537
19	0643	0821	1630	1809	0232	0414	1225	1406	0518	0657	1525	1703	0004	0143	1425	1604
20	0618	0759	1747	1928	0221	0403	1214	1354	0406	0544	1412	1550	0032	0211	1316	1452
21	0737	0918	1725	1906	0210	0351	1202	1343	0434	0611	1439	1617	0059	2349	1342	1520
22	0716	0856	1704	1843	0158	0340	1152	1332	0458	0639	1506	1644	0126	2413	1408	1546
23	0654	0834	1642	1821	0148	0329	1141	1321	0348	0526	1354	1532	0153	2303	1259	1436
24	0632	0812	1759	1941	0137	0318	1131	1311	0414	0532	1421	1559	0220	2331	1325	1502
25	0611	0750	1738	1919	0127	0308	1120	1259	0304	0441	1446	1625	0109	2358	1350	1530
26	0728	0909	1716	1856	0116	0256	1110	1248	0329	0507	1335	1652	0136	2246	1240	1417

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If so, were you satisfied with the result? ☐

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(Both or neither!)

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1 day S.E. conference, about £10 ☐ 1 day midlands conference, about £10 ☐

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Poor ☐ Not very good ☐ OK ☐ Very good ☐ Excellent ☐

Please add any comments or suggestions you wish to make about RIG or the Journal:-
(use another sheet if required).

Thank you. This information helps to guide the future of the Journal and RIG.

	NOAA 12				NOAA 14				OKEAN 4				SICH 1			
	S'bound		N'bound		S'bound		N'bound		N'bound		S'bound		S'bound		N'bound	
27 Jan	0706	0847	1655	1834	0104	0245	1238	1420	0355	0533	1402	1540	0023	2313	1307	1445
28	0645	0825	1634	1812	0053	0235	1227	1408	0246	0420	1428	1606	0050	2339	1333	1512
29	0623	0803	1751	1932	0224	0405	1217	1358	0310	0448	1316	1454	0119	2229	1222	1400
30	0601	0740	1730	1910	0213	0335	1206	1347	0336	0514	1343	1521	0005	2254	1249	1428
31	0719	0900	1708	1848	0202	0344	1156	1336	0227	0403	1409	1548	0031	2321	1141	1316
01 Feb	0658	0838	1646	1826	0152	0332	1144	1324	0253	0428	1257	1435	2212	2349	1204	1342
02	0636	0816	1625	1803	0140	0322	1133	1313	0317	0456	1324	1502	2236	2417	1232	1410
03	0614	0754	1742	1923	0129	0311	1123	1302	0206	0343	1350	1528	2306	2444	1123	1259
04	0732	0913	1720	1900	0118	0300	1113	1252	0233	0410	1238	1416	2154	2332	1148	1326
05	0710	0851	1659	1838	0108	0249	1242	1423	0258	0437	1306	1444	2219	2359	1215	1354
06	0649	0829	1638	1816	0058	0238	1230	1412	0324	0505	1331	1510	2249	2427	1106	1242
07	0627	0807	1754	1936	0227	0408	1220	1401	0214	0351	1219	1357	2137	2315	1132	1308
08	0606	0745	1733	1913	0216	0357	1209	1349	0240	0418	1247	1425	2203	2342	1157	1336
09	0723	0904	1711	1851	0205	0347	1158	1338	0128	0306	1312	1451	2232	2410	1047	1225
10	0701	0842	1650	1829	0154	0335	1147	1327	0154	0332	1201	1338	2120	2258	1115	1251
11	0640	0820	1628	1808	0142	0325	1137	1316	0221	0400	1227	1406	2147	2325	1140	1319
12	0619	0758	1745	1926	0132	0314	1126	1306	0109	0247	1253	1433	2035	2213	1030	1207
13	0737	0917	1725	1905	0121	0302	1116	1255	0135	0313	1142	1320	2100	2240	1057	1234
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16	0632	0811	1759	1939	0230	0411	1222	1404	0118	0255	1123	1301	2045	2223	1040	1217
17	0612	0749	1737	1918	0219	0401	1211	1353	0143	0322	1150	1328	2113	2251	1106	1244
18	0727	0908	1715	1855	0208	0349	1201	1342	0033	0209	1037	1215	2001	2138	0956	1133
19	0705	0846	1654	1833	0157	0338	1150	1331	0100	0237	1104	1242	2028	2206	1023	1159
20	0644	0824	1633	1811	0146	0328	1139	1320	0125	0304	1131	1309	2055	2233	1048	1227
21	0622	0802	1748	1930	0135	0317	1129	1309	0014	0151	1018	1157	1943	2121	1115	1255

	NOAA 12				NOAA 14				OKEAN 4				SICH 1			
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23	0718	0859	1706	1846	0113	0255	1107	1247	0103	0244	1112	1250	2038	2216	0854	1031
24	0656	0837	1644	1824	0103	0245	1236	1419	0000	0132	1000	1138	1926	2104	0921	1058
25	0635	0815	1623	1803	0233	0414	1225	1407	0021	0158	1027	1204	1953	2132	0946	1125
26	0613	0753	1740	1922	0222	0404	1215	1356	0047	2337	1052	1231	2018	2159	1012	1152
27	0731	0912	1718	1859	0211	0353	1204	1345	0113	2359	0941	1119	1909	2047	0904	1040
28	0709	0850	1658	1837	0200	0343	1153	1334	0141	2253	1007	1145	1934	2114	0929	1107
29	0647	0828	1636	1815	0149	0331	1142	1322	0026	2318	1033	1212	2002	2141	0955	1136
01 Mar	0625	0805	1753	1935	0139	0320	1132	1312	0054	2342	0922	1100	1851	2029	0845	1023
02	0607	0744	1732	1912	0128	0309	1122	1301	0121	2233	0949	1126	1917	2057	0912	1051
03	0722	0903	1710	1850	0117	0258	1111	1250	0008	2257	1014	1154	1807	1945	0801	0938
04	0700	0841	1649	1828	0106	0247	1239	1422	0035	2323	0903	1041	1831	2012	0828	1006
05	0636	0818	1628	1806	0055	0236	1228	1410	0102	2348	0930	1108	1901	2039	0855	1033
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09	0651	0832	1639	1819	0152	0333	1144	1326	2219	2358	0936	1115	1732	1910	0727	0905
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15	0621	0801	1748	1929	0228	0410	1220	1402	2142	2320	0721	0858	1658	1836	0651	0830
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18	0655	0836	1644	1823	0156	0337	1149	1329	2123	2301	0702	0840	1640	1818	0635	0812

THE CURRENT RUSSIAN SCENE

Geoff Perry MBE, The Kettering Group

Extract from the *Proceedings of the 10th AMSAT-UK Colloquium*, University of Surrey. July 27th-30th, 1995.

Meteorology

The long-awaited appearance of the Russian component for the First Global GARP Experiment, FGGE, of the World Meteorological Organization's Global Atmospheric Research Programme [GARP] Numerical Experimentation Programme, first proposed as GOMS, Geostationary Operational Meteorological Satellite[1], came with the launch of Elektro on 31 October 1994. Vladimir Kharitonov, Chief of Space Observing Systems and Solar Geophysical Monitoring, Russian Committee for Hydrometeorology and Environmental Monitoring, has said that a malfunction of equipment for vertical orientation, which resulted in a problem in orienting the satellite toward the Earth, was discovered immediately after launch. This was overcome but anomalies with the visible range of the on-board radiometer showed up during checkout[2]. Arne van Belle received some poor quality images in Rotterdam, one of which[3] had the caption "GOMS1 28 FEB 1995 12:00 IR" but regular, reliable imagery has yet to be seen.

The only Meteor-2 satellite launched in the past four years was orbited with the Italian microsatellite, Temisat, attached. Meteor-2 21's antenna may have been damaged during Temisat's separation as imagery has always been of inferior quality, improving as the satellite recedes from the ground station. Use of what may prove to be the final Meteor-2 may have been dictated by Telespazio's requirement for the lower, 104 min orbit[4].

Meteor-3 series satellites have orbits some 250 km higher than the Meteor-2s. Meteor-3 5, launched in 1991, carried NASA's Total Ozone Mapping Spectrometer, TOMS, and is still operational. Meteor-3 6 was launched together with the Technical University of Berlin's microsatellite, Tubsat 2 in January 1994 and carries CNES's Earth radiation budget scanning radiometer, Scarab, and DARA's precise range and range-rate experiment, PRARE. Very little APT imagery has been received from this satellite and it may be that its launch, within six months of Meteor-2 21, was to satisfy commitments to CNES and DARA and that at some time in the future, after a period of in-orbit storage, it will resume full operational status.

Meteor satellites have an infra-red capability which is tested during the early days of their missions but APT images are usually limited to passes for which the solar elevation at the sub-satellite point exceeds 5 degrees.

Remote sensing

The Russian equivalent of America's multi-spectral digital imagery Landsat pro-

gramme is the Resurs-O (Resource). Retrograde launches from Tyuratam using the Vostok booster placed Cosmos satellites into sun-synchronous orbits with periods around 97 min. The first Resurs-O to be named at launch used the Zenit booster in November 1994 and has a period of 98 min and a very circular orbit. The launch was delayed because Cosmos 1939, launched in April 1988, far surpassed its design life. The Israeli TechSAT-1 had once been manifested as a piggyback payload for that launch. Instead it carried the German Safir-R demonstration package which remained attached to the Resurs-O.

Two variants of a recoverable photographic imaging system, Resurs-F1 and Resurs-F2, based on the military photoreconnaissance satellites are flown. The F2 version is equipped with solar panels to support an increase in mission duration from 16 to 30 days. ⊕

1 W M O No 411, Geneva, 1975.
2 Dennis Chesters, *Internet*, 21 Mar 1995.
3 *RIG Journal* No.41, Jun 1995, p 68.
4 Wakelin, Peter, *RIG Journal* No.35, Dec 1993, pp 57-58.

GALILEO UPDATE

Galileo is on the final leg of its journey to the giant planet Jupiter. On 11 October engineering data returned from the spacecraft indicated a problem with the onboard tape recorder. The problem was detected shortly after Galileo took an image of Jupiter and its major moons from 35 million kilometres away. After taking the three images required for a colour photograph to be produced, the tape recorder used to store the data was commanded to rewind. Data received from Galileo suggested the tape recorder did not stop as expected after rewinding. Commands were sent to halt the recorder and place it in standby mode.

The recorder was tested on 20 October and found to be operational. Project officials, after studying engineering data from the spacecraft, believe they understand the problem and consider it to be manageable. It is not now expected to jeopardise the return of almost 2000 images of Jupiter and its moons that are to be stored on the recorder for playback over the course of Galileo's two-year tour in orbit around the planet.

On 7 December Galileo's main engine will be fired to place it in orbit around the planet and the probe, which separated from Galileo in July, will plunge into Jupiter's atmosphere and relay data to Galileo. ⊕

RECEIVING WEATHER SATELLITES - THE PORTABLE OPTION

Nicholas Freeman, SN072A

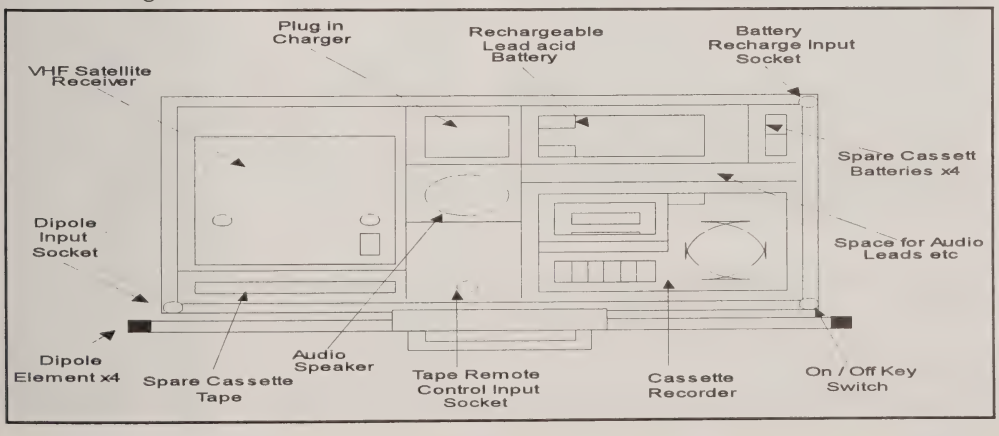
Where I live it is difficult to erect a dipole to receive polar-orbiting weather satellites so I decided to build a compact, completely portable system. For housing the receiver, tape recorder, batteries and accessories I chose a rigid case of the type normally used for photographic or video equipment. They are strong, contain a foam lining for protection and the silver-coloured exterior reflects heat so are ideal for keeping £300 worth of equipment protected and cool.

To carry the antenna and 20 foot mast I made a container from a 4 foot length of 6 inch soil waste pipe. One end was sealed with a plastic flowerpot saucer bolted on and filled with silicon mastic. The lid was made similarly but clipped on with toggle catches. A couple of coats of Hammerite paint, a shoulder strap and a layer of one inch thick foam inside the tube completed the job.

All this is OK in fine, summer weather but for inclement conditions I bought an all-weather nylon shelter of lightweight and simple construction. The assembly can be erected in a matter of minutes and folds to fit a 20 x 5 inch tube.

The total weight of the equipment is about 20kg or 40 odd pounds. To some people this may seem too much but within that package is a complete weather satellite receiving station.

To decode the recorded signals I use a tape conversion interface which was home-built to a design provided by RIG member Richard Osborne and the popular Martelec JVFAX interface to display the image on a PC. Image quality is mostly good from the NOAA satellites and Okean but Meteor images are a bit hit-and-miss as the 2.4kHz sync signal seems less accurate than it should be. However, with satellites above about 20 degrees elevation, excellent results can be achieved.



STORED IMAGES FROM OKEAN AND SICH SPACECRAFT

Peter Wakelin

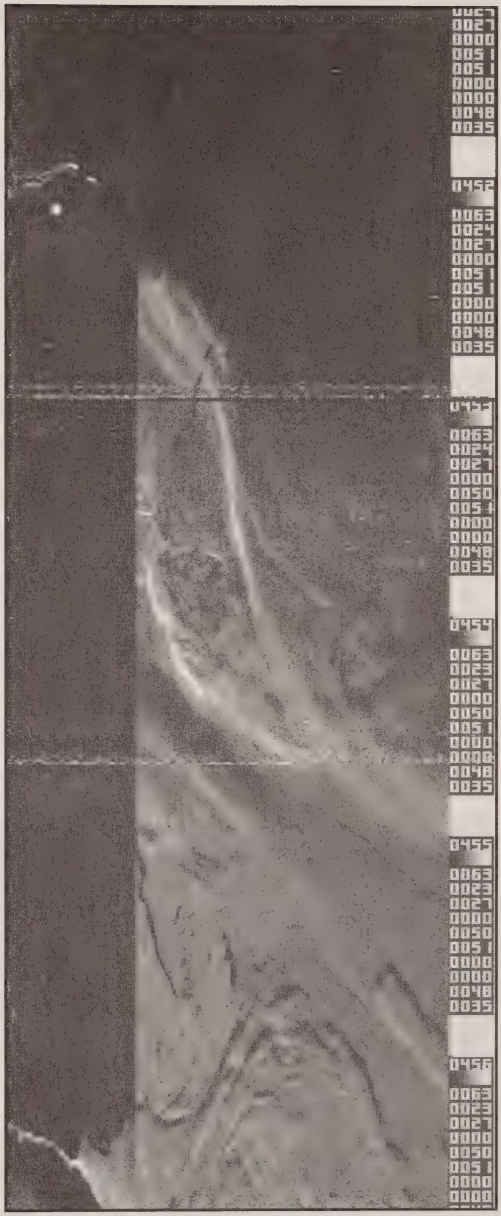
These spacecraft, which appear to be virtually identical except in name, have the ability to store some 6 minutes of imagery on board for reading out to a ground station at a later time. Many spacecraft employing such a system use a much higher rate of data transmission when dumping stored images but Okean and Sich use the normal APT type of transmission. I suspect that some readers have received recorded images without realising it. A discontinuity in the numerical edge-code is usually a sign of a recorded image starting and, at the end of a recording, a continuous tone is usually heard if the spacecraft is still within range. Check the "clock" on the image against the time of reception. If the first number in each one-minute block on the image, less 180, does not equal the time in minutes since midnight (UT) at which the image was transmitted, then it was almost certainly a recorded image. It is not quite a certainty because on a few occasions, on earlier Okeans and their precursors in the Cosmos series, the onboard clock was found to be in error.

The first image reproduced here was received on 29 October. Sich 1 sprang into life a few seconds after 1041UT when southbound over eastern Europe. The image ceased 6 minutes and 12 seconds later but a continuous tone was heard until the spacecraft went over the horizon shortly after 1049. The image clearly shows the west coast of Africa from Guinea Bissau in the south to northern Mauritania where the northeast-southwest orientation of the vast dune formations can be identified. The image was cropped to show just part of the 3cm radar data. The vis image was blank as this scene was recorded during the night, some 8 hours earlier.

Recently, John Boyer was looking through his Okean 4 images and found a scene which he was unable to identify. Being such a well organised and meticulous chap, he recorded the date and time of reception. It was almost a year ago and not long after Okean 4 was launched. The image "clock" time differed by many hours from the time of reception which indicated a recorded scene and, as John does not retain orbital elements for a year, he e-mailed the image to me to investigate.

The clock times on the image run from 452 to 456 minutes after midnight Moscow time, or 0432 to 0436UT. Predictions for these times on 22 November 1994, which is early summer in Antarctica, showed that Okean 4 was crossing the Antarctic peninsula southbound. More precisely, at 0432 it was above 65S 66W near

to local midnight and by 0436 was over 78S 45W. The radar swathe extends from about 250 to 700km out of the left side of the craft and the visible swathe covers from near the ground track to about 1000km to the left side.



Plotting the track on a large-scale map of Antarctica made it fairly easy to identify some features in the images. Firstly, the radar image on the left; the bright spot adjacent to the number 0452 is the 5340ft peak of James Ross Island (see RIG 41 page 45) with the peaks of Trinity Peninsula and Joinville Island just above it. The sea ice over the Weddell Sea is not very conspicuous but towards the bottom the radar scans the edge of the Filchner ice shelf. Huge chunks broke off this part of the shelf in 1986 so the shape here does not fit the 1973 ice edge shown on my map.

Turning to the visible image, the Sun was just below the horizon at the beginning of the image in the north and around 10 degrees above the horizon at the bottom of the image. The high cirrus cloud is the first to catch the rising sun and through it, adjacent to number 0453, can be seen a dark line. Currents and wind have moved the melting sea ice away from the Larsen ice shelf leaving a strip of clear water. This same part of the shelf shows at the bottom centre of the image in RIG 41 which was taken a few weeks later. Another clear zone is evident further south along the edge of the ice shelf. Beyond this point, banks of cloud lie over the ice and the brighter, sunnier sides and the long shadows cast on the ice by the low sun are readily discernible, most notably on the cloud bank near to the number 0456.

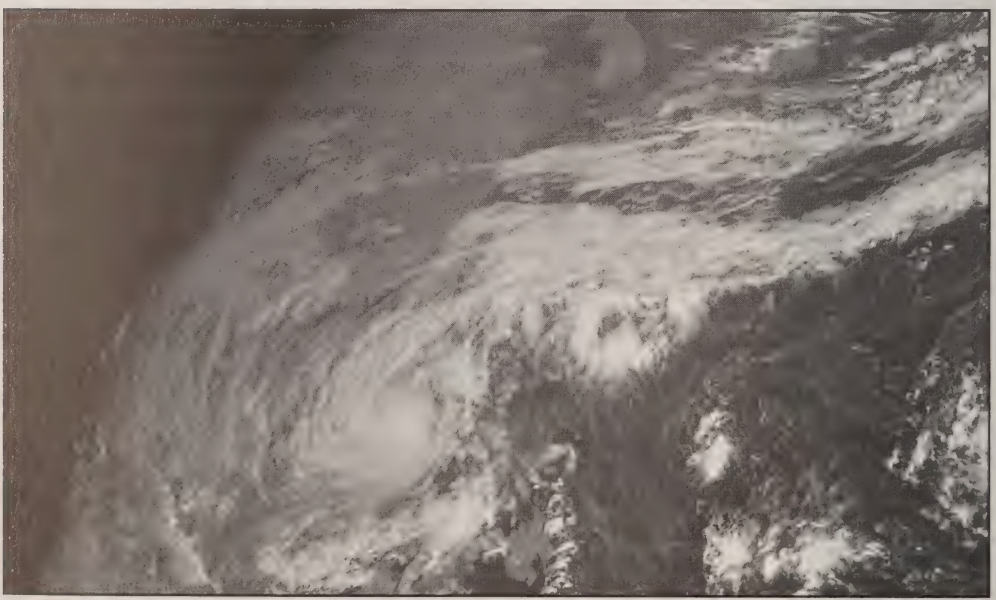
Thanks, John, for a couple of enjoyable hours spent solving this puzzle. ⊕

WORLD WEATHER HIGHLIGHTS
August - October 1995

August temperatures in southern Chile and Argentina were well below normal and in mid-month the worst snowstorms for 40 years killed 20 people and over 250,000 cattle and sheep. Caracas, Venezuela lost many homes in mudslides following exceptionally heavy rainfall. Hurricane Ismael killed 50 people, mostly fishermen, off the northwest coast of Mexico in mid-September. Weather satellites detected over 30,000 forest fires in Brazil, most of them started deliberately.

Much of Britain and parts of nearby continental Europe had well above average temperatures throughout these three months with all-time records broken in many places. Kinloss, Scotland reported an all-time monthly rainfall record in September when over 11 inches (275mm) fell by the 12th of the month! While ducks were rearing youngsters in London's parks during late October's high temperatures, NW Iceland was experiencing exceptionally severe early winter weather. 2m of snow fell causing avalanches which destroyed 17 homes in Flateyri killing at least 19 people.

Sydney, Australia recorded its worst drought for 137 years but there was no shortage of rain in the northwest Pacific area where, as in the Atlantic, there has been plenty of tropical storm activity this season. Typhoon Faye was the strongest to affect Korea for 40 years. The Phillipines have been affected by a series of storms; Typhoon Kent's heavy rainfall caused catastrophic mudslides of Mt Pinatubo's volcanic ash which



buried several villages. Right at the end of this summary period, Typhoon Angela reached the northern Phillipines, killed at least 300 people and destroyed all crops over a vast area. As well as being large in size, Angela was the strongest to hit the country for 10 years. The GMS 5 image shows Angela after crossing Luzon and heading for Vietnam at 2300UT on 3 November. The island of Mindanao is at bottom centre. Image courtesey University College, London. [ftp://weather.cs.ucl.ac.uk/Weather/gms] ⊕

RIG*sat* IF1 - Synchronous JVFAX Interface
Ray Godden & Bryan Taylor

We are working on a PC parallel-port interface for JVFAX weather satellite reception. It is inspired by the design published by Greg Jameson in RIG 42. Synchronous analogue to digital conversion is featured, compensating for Doppler shift and tape recorder speed fluctuations. We aim to have a RIG*sat* PCB available in January 1996. Total cost of the parts, including the PCB, is expected to be £20 or less. If you are interested please contact Bryan Taylor so that the demand can be estimated.

Bryan Taylor, 161 Sidegate Lane, IPSWICH, IP4 4JN. Tel 01473 726667. ⊕

NEW USE FOR OLD WEATHER SATELLITE

A quick glance through orbital elements of old, geostationary satellites shows that, after their station-keeping fuel is exhausted, their orbital inclination increases slowly under the perturbing influence of the Sun and Moon until it reaches around 15 degrees.

GOES 3 , launched in 1978, ceased imaging some time ago and has been used as a relay for data from other satellites. Now that GOES 8 and 9 are operating successfully, GOES 3 has become redundant. Its inclination has now reached 11 degrees and of the 12 hours it spends south of the equator every day, it is sufficiently far south to allow communications between scientists at the South Pole and the USA for about 5 hours a day.

The South Pole Infrared Explorer telescope (SPIREX) and the almost completed Antarctic Muon and Neutrino Detector Array (AMANDA) were designed for remote operation and these projects will benefit greatly from the improved communications. Within about two years further capacity is expected to be needed and the services of an aging relay satellite TDRS 1 may be called upon. ⊕

INTRODUCING THE MSR50 - A VIRTUAL WEATHER SATELLITE RECEIVER

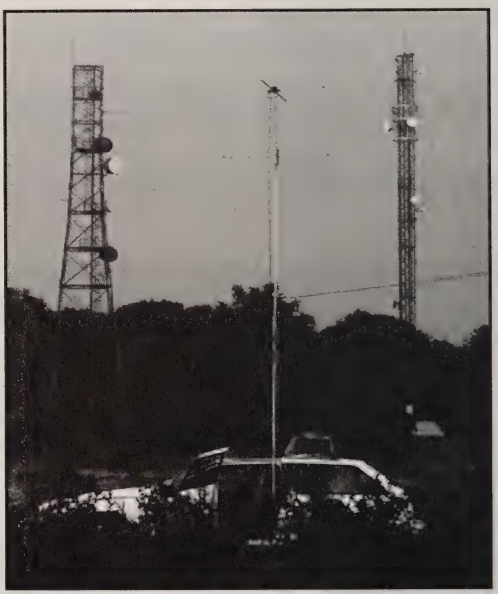
Chris Pretty

The article describes the new MSR50 computer-controlled receiver and some powerful automatic control functions available when used with JVFAX 7.0.

Introduction

Ten years is a long time in a technology-intensive pursuit like WXSATing as a glance back at those early RIG newsletters, which first appeared ten years ago, will remind you. It was a time when framestores ruled screens which were free from the pager blite, and a receiver only needed to be sensitive to be 'good'.

The rapid growth in personal communications which we all apparently crave has resulted in an increasingly crowded RF spectrum and, here in the UK, the 'pollution' of the 137MHz satellite band by paging transmitters on frequencies around 138Mhz. The much higher relative power from the terrestrial paging transmitters (usually 100W) has little difficulty finding its way onto our omnidirectional antennas and thence into our highly sensitive and moderately wideband receivers.



Successful field testing of the MSR50 about 300m from communications masts, using a crossed dipole mounted on a 6m mast. Pager services were operating from the left-hand mast on 137.975MHz & 138.100MHz. Two further masts are just out of picture to the right.

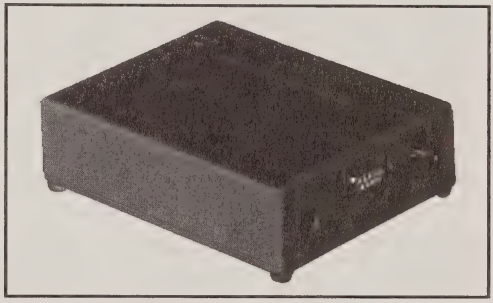
The challenge facing Martelec and other receiver manufacturers is to provide a cost-effective solution to this dilemma and offer a receiver that is able to co-exist with these high-powered growling neighbours around 138MHz. The Timestep PROscan receiver was the first serious attempt by a manufacturer to address this problem and was followed in 1992 by Martelec's MSR40, setting a benchmark in interference-resistant receivers. Although technically very successful, the MSR40 was not affordable by everyone who would have liked to indulge. Was there some way in which the price could be dramatically reduced without sacrificing performance?

This is the background against which the MSR50 receiver was developed. At less than half the cost of its predecessor, the

MSR50 utilises the power of the PC to perform the control tasks of the receiver. Not only did this reduce the cost but simultaneously offered scope for enhanced control functions. Instead of the brushed aluminium front panel with knobs, switches and indicators, the user has an on-screen receiver control panel, with digital frequency display, frequency memories, and automatic fine tuning control and more, controlling a small ruggedised 'dongle' receiver connected to the parallel port. Just as with any other receiver, there is an antenna input socket, and APT output socket. However, all the control takes place from the keyboard/mouse of the host computer - a virtual receiver.

The MSR50 measures only 120x95x50mm and, though highly compact, it is nevertheless extremely powerful and is a true high-performance receiver. Key to this level of performance were the following:

i) Use of a modern, wide dynamic range front-end circuit.
ii) No image responses due to upconversion of first IF.
iii) Use of SAW filter at first IF frequency



The MSR50 Receiver

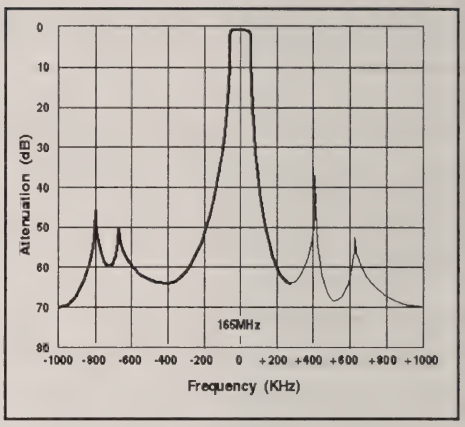
Of course none of the above by themselves bestows 'good' performance on a receiver but coupled to the usual requisites of proper gain distribution and layout they go a long way.

Technical Description

The MSR50 is a triple conversion superhet, with IF frequencies of 165MHz, 10.7MHz and 455KHz. Choosing an unconventional first IF of 165MHz has the advantage that there are no images within the receiver bandwidth. The mixer and RF amplifier are crucial to the interference handling of the receiver; they must both have wide dynamic range so that large signals arriving at the antenna input do not lead to non-linearity and intermodulation products. Several configurations were tried before finally settling on the GPS SL6444 - a modern integrated amplifier/mixer meeting these requirements.

The receiver is tuned by changing the synthesised local oscillator frequency and, although advantageous to have the first IF at 165MHz for reasons discussed above, it does imply that the local oscillator runs at either 28MHz, or 302MHz. Because the sixth harmonic of 28MHz falls within the SAW filter passband this simpler of the two options could not be used and so the synthesiser runs at around 302MHz. Surface mount technology is used extensively for the receiver front-end and synthesiser sec-

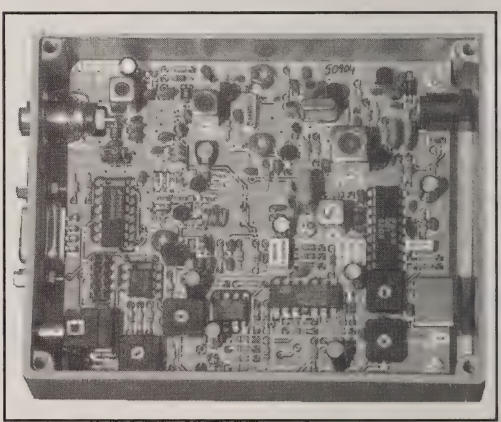
tions for both technical and space-saving reasons. The synthesiser IC is serially programmed directly by the host computer via its parallel port, allowing the user to tune in 5kHz steps (with the AFT using 2.5kHz steps).



The 165MHz first IF is filtered by a SAW (surface acoustic wave) filter having a very sharp cut-off outside its 80kHz bandwidth, further helping to eliminate out-of-band signals. The signal is then converted to 10.7MHz, filtered, and further converted to 455kHz prior to demodulation. The 455kHz circuitry generates squelch and frequency error signals which are fed back to the host computer for use in the scanning and AFT modes.

The MSR50 features separate 3-pole Butterworth high-pass and low-pass filters forming an 900Hz - 4000Hz APT passband filter. An electronic switch under software control selects either this signal, or via the Auxiliary I/O port an external APT signal from another receiver before routing it to the amplifiers. There are separate amplifiers serving the phono output socket and internal loudspeaker, each with its respective level/volume control.

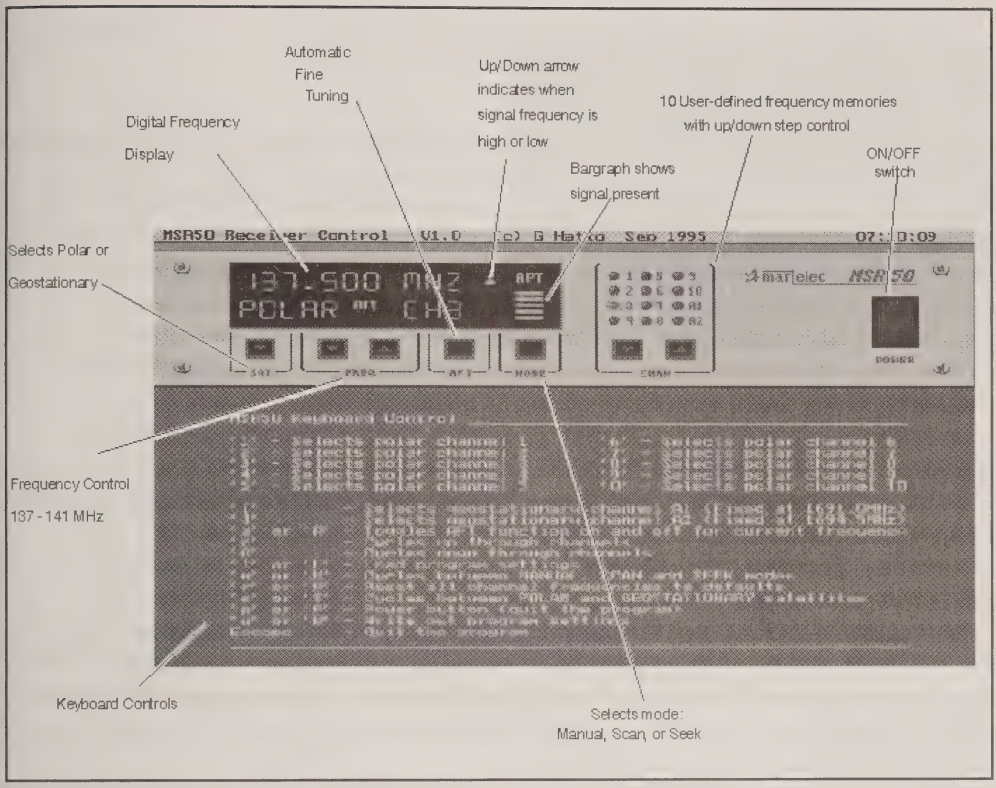
The Auxiliary I/O port, besides accepting an external APT signal, also provides a 12V power supply suitable for a downconverter or Meteosat receiver and a software-controlled channel select line for switching between Meteosat channels.



Internal view of the MSR50

The MSR50 is supplied with control software for either the Amiga or PC computers and, whilst there are detailed differences between the two versions, the features and facilities described here are common to both.

Running the control software presents the user with the on-screen receiver shown (the resemblance to the MSR40 incidentally is no accident). The user can either point and click on the appropriate receiver buttons using the mouse, or directly key in from the keyboard - or indeed, a combination of both. The user may store any frequency, in



On-screen Control Panel - PC Version.

any of the 10 frequency memories, and recall them either manually or in one of the scanning modes. Two further memories are reserved for Meteosat channels A1 and A2 and here the user can invoke additional options when one of these is selected.

As with so much that is technology-based, the trend lines point to ever increasing performance, coupled to decreasing cost. A complete polar orbiting station based on the MSR50, JVFAX interface and antenna is realisable for an outlay of under £300. There has never been a better time to get started in the hobby! ⊕

FOR SALE. 1.3m diameter satellite dish. Ex RN in good condition. £35 plus carriage. WANTED. PCSat3 or PCwSat3 card and software. Can do an exchange deal if required. Details ring 01364 643608 - Jack Roberts G3GZQ QTHR South Devon.

AUTOMATIC RECEIVER CONTROL USING JVFAX 7.0

Chris Pretty

Some exciting and powerful possibilities are available to JVFAX users with the MSR50. This is because there are a number of opportunities within the JVFAX program to execute DOS commands, making it unnecessary to quit the JVFAX application to execute an MSR50 control. To complement this facility, the MSR50 control software allows re-tuning to a new frequency simply by typing, for example, MSR50 137400 at a DOS command line within JVFAX. This example, and the others which follow, assume that the MSR50 control program files are resident in the same directory as the JVFAX files. Although not essential, this minimises the length of any MSR50 commands by doing away with the need to include a path.

If you are not totally familiar with JVFAX and where you can find these DOS command lines, here is a quick guided tour, with page numbers in brackets referring to the JVFAX manual for more detailed reading.

ALT<F10> Hot Key

Pressing the ALT<F10> key will display the 'Program Starter' window, as shown in Fig. 1. This makes available up to nine external DOS programs, and the DOS shell (p 14). Selecting one of the keys 1-9 will directly execute that program and return to JVFAX. In the example shown, some common satellite frequencies have been loaded so that by pressing ALT<F10> followed by a number (1-9) the MSR50 will alter frequency. So, selecting '1' would bring up the MSR50 control panel, whereas if '4' was selected, the MSR50 would simply re-tune to 137.500MHz and return to JVFAX without displaying the control panel.

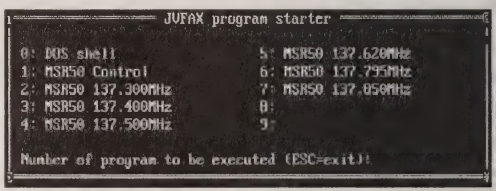


Fig. 1.

The 'Program Starter' window is set up and edited via the Configuration Menu, by moving to DOSCMD at the bottom right-hand corner and pressing ESC. That will bring up the screen shown in Fig. 2. Note that the left-hand 'Description' can hold any desired text, but the right-hand panel should follow the exact format shown, with one space between 'MSR50' and the 6-digit number (no decimal point).

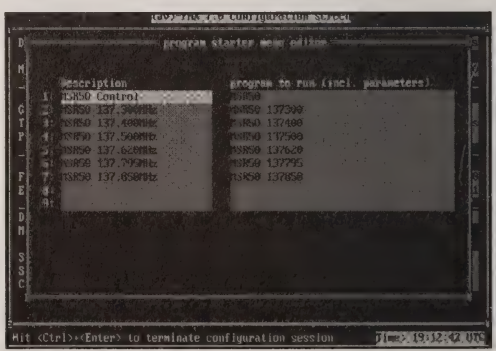


Fig. 2.

Mode Editor

This is the screen (Fig. 3) which allows the user to set up the various parameters associated with each mode; including a DOS command line, which can be used to automatically set the MSR50 to a particular frequency whenever that mode is chosen. For example, we could edit Mode 6, typing MSR50 137400 into the 'Execute DOS command' line, (p 23) such that every time Mode 6 is selected in JVFAX the MSR50 will automatically re-tune to 137.400MHz.

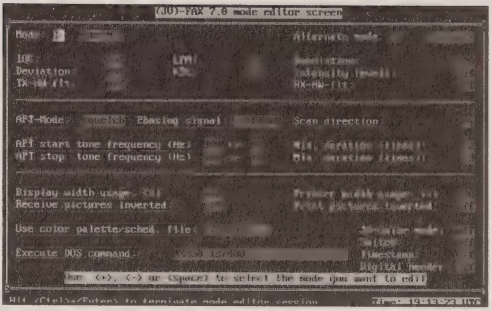


Fig. 3.

Similarly, if the MSR50 is used for the reception of Meteosat, using a downconverter, we could edit Mode 3 (Meteosat channel A1) to set the receiver to 137.500MHz, and Mode 2 (Meteosat channel A2) to set the receiver to 141.000MHz. Hereafter, whenever one of these modes was selected, the MSR50 would automatically re-tune requiring no channel-switching of the downconverter. A secondary bonus of this approach is that the actual stored frequency could be offset if, for example, it was known that the ouput of the downconverter was slightly high or low.

Date Driven Fax Reception

This is perhaps the most powerful tool for use with the MSR50, making it possible to programme JVFAX to automatically receive satellite images at different times and on different frequencies (p 24-27). Here the user can define up to 96 different date/time events in a file, each one of which can have a set start time, duration, and frequency associated with it. So no excuses for missing any satellite passes whilst out at work! The example below shows how a typical 'file for the day' might look.

The 'Edit Date Driven Fax Reception' option is chosen from the main menu to display the screen shown in Fig. 4. The inset 'Date Editor' window comes up when F2 is pressed and allows individual lines to be compiled/edited. Note the 'Execute DOS command' line in this window, where the MSR50 frequency command must be entered. At the prescribed time(s) for each entry the JVFAX program will set the MSR50 to the appropriate frequency and save, display, or print the image as required. The example shown

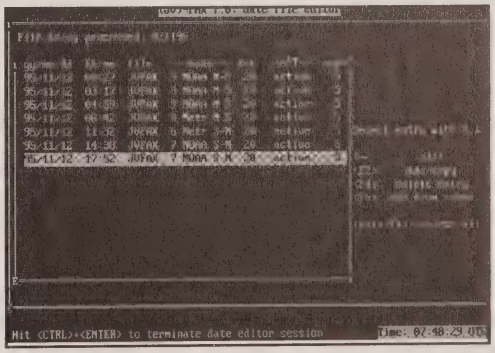


Fig. 4.

has dates for the same day but, with up to 96 possible event entries, one could schedule a whole month's reception, given sufficient patience and a large enough hard drive! ⊕

THE NEW JVF2 INTERFACE FOR JVFAX

Chris Pretty

JVF2 Features

Launched recently, this upgraded version of the JVF1 interface which it replaces, is proving just as popular. This article describes the hardware and firmware improvements and goes on to describe how a simple modification to the JVF1 can improve WXSAT image sharpness. Compared to its predecessor, the JVF2 features the following enhancements:

Direct connection to the forthcoming IMR50 Integrated Meteosat Receiver
Revised firmware for direct control of a Meteosat receiver from within JVFAX
New I/O port with dedicated Tx flag line (PTT) for driving Rx/Tx relay
Enhanced APT input sensitivity for use with low output receivers
Improved APT filtering for even sharper WXSAT images

The latter part of this article describes how owners of the JVF1 can upgrade it for the improved APT filtering.

Outwardly, the JVF2 looks very similar, except for a new 6-pin mini-DIN AUX I/O port which replaces the old Receiver Control port of the JVF1. The primary role of this new I/O port is to provide an easy and convenient means of powering and channel-switching a downconverter/receiver and taking in an APT signal - all under the software control of JVFAX. Additionally, amateurs wishing to transmit can use their JVF2 to control a Rx/Tx relay from JVFAX. A 'spare' software-controlled line is available for experimentally-minded users to utilize as they wish.

Pin No.	Function
1	Transmit relay control line (Tx = hi, Rx = lo)
2	Spare (Activated by Tx-Hw-filter)
3	Meteosat channel select line (A1 = lo, A2 = hi)
4	APT input from ext. receiver
5	+12V in/out
6	0V (GND)

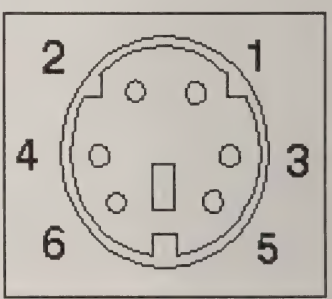


Fig. 1.

Meteosat Receiver Control

Looking at the Miscellaneous Settings table under JVFAX's Configuration menu reveals a list of hex codes, which the user can edit to implement control of the three new AUX I/O lines to suit his particular setup. It will be noted that several new hex codes have been used, and of course the software programmed into the JVF2 microprocessors has been modified to recognise them.

	Normal	ATC	Comments	AUX I/O Pin
FM150Hz	41	43	HF fax via 'FAX IN'	-
FM200Hz	42	4C	HF fax via 'FAX IN'	-
FM300Hz	47	4D	HF fax via 'FAX IN'	-
FM350Hz	44	4E	HF fax via 'FAX IN'	-
FM400Hz	45	48	HF fax via 'FAX IN'	-
FM500Hz	46	4F	HF fax via 'FAX IN'	-
AM1 [Polar	49	49	APT signal input via 'APT IN'	-
satellite types]	59	59	APT signal input via 'AUX I/O'	-
AM2	4A	4A	APT signal input via 'APT IN'	-
[Meteosat]	5A*	5A*	APT signal input via 'AUX I/O'	-
	off:	on:		
Transmit	34*	35*	Transmit relay on/off	1
Tx-HW-filt	52*	53*	Spare peripheral control	2
Rx-HW-filt	50*	51*	Meteosat: off=lo=A1, on=hi=A2	3

* New hex code

Now at this stage do not let the terms Tx-Hw-filt, and RX-Hw-filt confuse you; they were intended by the author of JVFAX for another purpose; we have simply hijacked them because they are convenient for our use. Having edited the Miscellaneous Settings table above, it will be necessary to switch the RX-Hw-filt 'on' or 'off' in the relevant JVFAX modes as required.

Example:

Suppose we have a Meteosat system comprising an IMR50 integrated downconverter, receiver, and JVF2 interface, as illustrated in Figure 2, and we decide we want the APT signal to go into the AUX I/O port....

We start by editing the Miscellaneous Settings table, setting the AM2 codes to 5A. This tells the JVF2 to take the APT signal from the AUX I/O port (pin 4). Next we edit the codes for Rx-Hw-filt to 50 & 51 as illustrated above. Also, we must edit the modes 2 & 3 (Meteosat channel A2 and channel A1 respectively) by setting the Rx-Hw-filt to 'on' in Mode 2 and 'off' in Mode 3. Save these settings by pressing CTRL + ENTER.

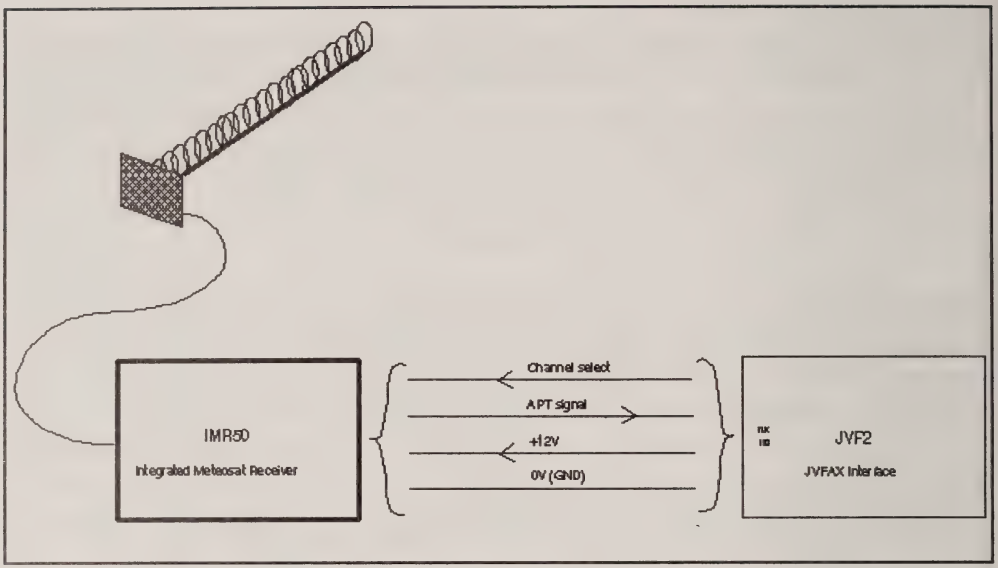


Fig. 2.

That's it; every time now that either Mode 2 or Mode 3 is selected in JVFAX, pin 3 of the AUX I/O port will toggle high or low to select the appropriate Meteosat channel from the IMR50 and JVF2 will be 'listening' for the APT signal at pin 4 of the same port.

If a conventional downconverter and separate receiver are being used instead of the IMR50, it may be necessary to use a little interface circuit as illustrated in Figure 3 to

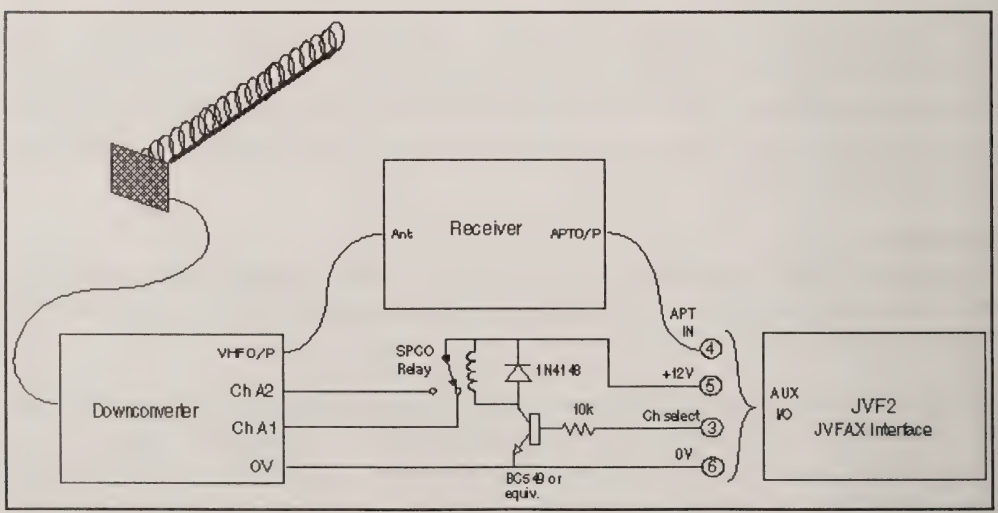


Fig. 3.

switch the downconverter between channels. Whatever the particular setup, it is possible to configure a system controlled entirely from the keyboard through JVFAX.

JVF1 Upgrade

Whilst most JVF1 owners would consider the WXSAT image quality to be very good, there is nevertheless always scope for improvement.

There are various techniques available for demodulating the 2.4kHz sub-carrier to baseband: The JVF2 uses a precision rectifier followed by a baseband low-pass filter; the requirements of this filter are that it allows all frequencies from DC to 1.6kHz but provides substantial attenuation at 2.4kHz and above. This is quite a demanding task, for which the JVF1 employs an 8-pole switched capacitor Elliptic filter IC, associated with which is an 82pF capacitor (C11). This should be increased in value to approximately 210pF. This capacitor is identified on the placement diagram (Figure 4).

There are two ways in which C11 can be increased; either by removing and replacing it with a 220pF capacitor, or by adding a 120pF capacitor in parallel with the existing 82pF, on the underside of the PCB.

After carrying out this modification just make sure that there are no solder splashes to cause shorts and re-assemble. One tip here is to use a small screwdriver to guide the level control spindle through the hole of the case.

Testing

If you have some images stored before the upgrade, you will be able to do a 'before and after' comparison. In particular, look for sharper vertical registration on the sync bars at the edge of the image, and if you are receiving Meteosat notice the crisper text on image headings, and the smallest text on the test card. Finally, if you were one of those experiencing the so-called 'brown paper effect' (subtle vertical lines) this will also have disappeared.

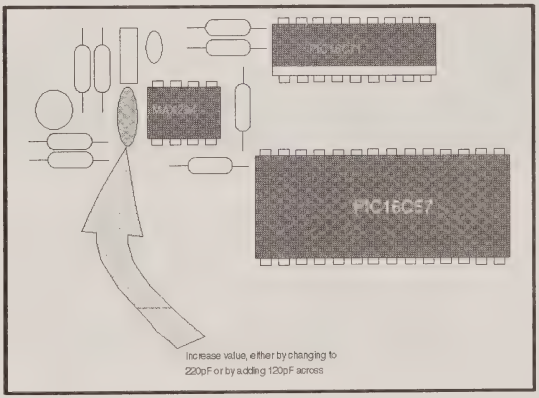
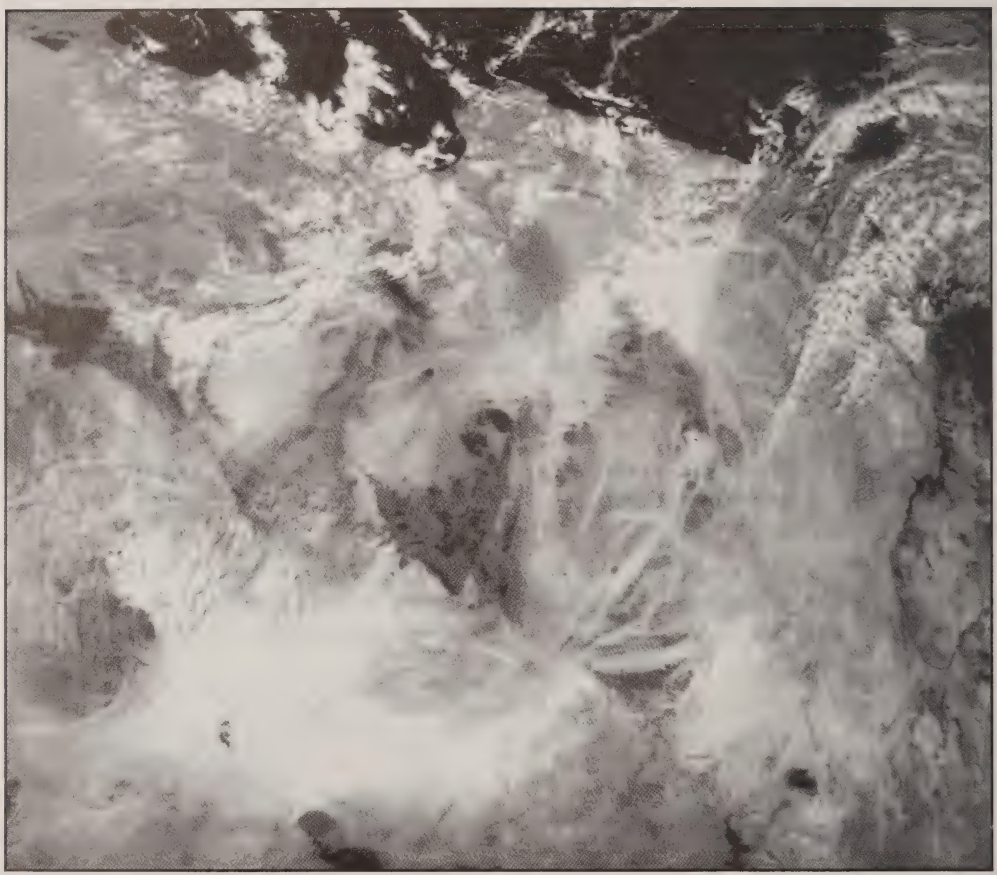


Fig. 4.

Anyone seeking additional advice before embarking on this modification can contact Martelec on 01420 82752. If you do not feel competent to carry out the upgrade yourself return your JVF1 to Martelec with £5 to cover return carriage and insurance and they will do it for you.

A METEOSAT RIDDLE - ANSWER



1. The hair is womanly but the Adam's apple is manly.
2. Between Libya and Chad. The facial features are drawn by the Tibesti Massif whose highest peak (Emi Kaussi, 11204 ft at 19.7N 19E) probably marks the Adam's apple.
3. WEFAX visible C2D and C3D sub-formats.

Notes: Both pictures are part of an AV digital format image. In picture 1 all the lines have been printed. In picture 2 above, alternate lines have been printed thus obtaining the same resolution as the AIVH format. This image shows the southeastern Mediterranean and the Nile valley. The "face" is near the centre. [Marciano provided these images as prints produced on his photo-fax system. Scanning and screening for the printing process may alter the relative resolutions of the two images and introduce aliasing patterns. - Ed]

MEMBERS' LETTERS

Dear Peter,

During my five years of membership I have watched the Journal grow from strength to strength. Its only weakness is the letters page with fewer and fewer in recent issues. Presumably, this is due to either only a small amount of space allocated to letters or few are written to you. Assuming it is the latter, I decided to do something about it.

I passed the RAE many years ago and although I still have great interest in radio, the weather is my primary motivation in remote imaging and I find your own regular series very interesting. Would it possibly help the balance of the journal if there were more articles concerning the actual content of our images rather than just their reception?

I have recently updated my receiving station from a good old BBC Master and Martelec framestore to an Amiga 1200 running Amigasat. The Amiga has just been relaunched and I hope we will now see better support for it. The graphics are very good which give as good a NOAA APT image as possible. When I get a hard drive (and a downconverter) I will achieve Meteosat animations with the number of frames limited only by the capacity of the hard drive.

So, while I await the revival of Amiga Corner in the journal and see the Amiga established as THE number one, I would be grateful to any members already using the Amiga if they could drop me a line telling me about their set-ups. Perhaps system developers should start designing a HRPT interface in anticipation of a big demand!

Regards, Paul Matley, 13 Kildare Ave, Thornton-Cleveleys, Lancs, FY5 2RZ.

[With telephone call charges falling all the time, letter writing seems to be dying out. I receive very few of the thought-provoking sort I would like. Our last survey showed that only 4% of our members with computers chose the Amiga. Fewer still use a Macintosh. I see a similarity between PC versus the rest and the VHS/Betamax arguments of a few years ago. Who uses a video recorder with the Betamax system these days? Surely that will provoke a few people into writing to the editor! - Ed]

Dear Peter,

I saw in the latest journal that you are seeking material for a bumber December issue so decided to tell you of the fun I had making the parabolic dish described in RIG 40. The listed materials were not easily found in this suburb of Toronto so I had to use

what was available. Most of the structure was fabricated from 0.75 inch L-section aluminium of thickness 0.125 inch. I began by making a full-sized wooden mandrel of a rib and after cutting ribs to length proceeded to strain my 71 year old frame against the aluminium in a large vice. This task went very well and I quickly had the 12 ribs shaped. They were bolted between two 5 inch disks and the whole assembly attached to two short lengths of 1.25 inch diameter pipe to form a gimbal system to allow E-W and N-S adjustment. The feed head was a bit more tricky as suitable materials were hard to come by. I improvised and made the helix from flattened half-inch copper tube supported by part of a toilet brush handle. The quarter-wave adapter and N-type connector assembly took some innovation but the the final result was great.

The dish is mounted 10 feet above ground between two 20 feet high towers. I use a downconverter made by Multifax fitted about 4 feet from the feed. From my location I use not Meteosat but GOES 8, which is almost due south. WEFAX certainly gives a wider view of the weather pattern movements but lacks the detail of APT from the polar-orbiters. Personaly, I am more fascinated by the fine detail so that, should finances ever permit, I would like to pursue the HRPT chase and, judging by the articles in the journal, I am not alone in this desire.

Sincerely, Arthur Holmes, 1563 Jaywin Circle, Pickering, L1V 2W3, Canada.

Dear Peter,

I wish to thank you and your editorial team on the production of yet another excellent issue of the RIG journal (No. 42). Well done.

I read with interest in that issue about a proposal to change the journal's format size. As a member of long standing I wish to plead that the following points be considered before introducing any changes: There are members, myself included, who have purchased binders not only for past issues but for future ones as well. The present A5 size is convenient to carry around and to read when travelling. BARTG and the British Amateur Television Club also produce A5 sized publications.

Regards, John Morris, 132 Markland Hill, Heaton, Bolton, BL1 5EJ.

[Thank you for your kind remarks about RIG 42. Several others have commented on the possible change to A4 size. Most were concerned about the increased risk of damage whilst in transit. The main advantage of a larger format is the greater scope in laying out the pages and obviating the need to turn images and diagrams through 90 degrees on occasions to improve legibility. Also, we are currently restricted to about 100 pages as the simple two-stitch binding we employ cannot cope with a thicker issue. Regrettably, some members discovered this with last December's issue

which had 112 pages. I would not want to see a change occur other than starting with a March issue and I can assure members that A5 will continue through 1996. - Ed]

Dear Mr Wakelin,

I found Richard Osborne's article on prime focus feed horns very interesting. I built a 1.3m dish from an aluminium frame covered with a stainless steel mesh and had the same problem trying to find suitable literature about feed horns. I ended up with many sketches, all with differing dimensions for each part of the horn. I just averaged the dimensions of each design and ended up with a horn longer than the one described in the article but with the probe at the same location. I built a horn using the formulae quoted by Mr Osborne and all I received in return for my efforts was a horn of similar, or slightly inferior performance to my original one!

It was interesting to note that in all the published articles I used initially it was stated that the design was not very critical. I now know that these people went through the same process as I did.

Yours sincerely, J Makkinje, 4 Sedburgh Drive, Kendal, LA9 6BJ.

Dear Peter,

Usually, I am disappointed with the service I receive from most suppliers when a problem arises but this time I have been pleasantly surprised.

The supplier in question is Dartcom. I purchased a downconverter from them but found it faulty on one of the Meteosat channels. I posted the unit back to them on a Wednesday and a replacement arrived on Saturday morning! They despatched it first class letter post, whereas they could have saved themselves a few pounds postage by using Parcel Force.

I hope you will publish this letter as this kind of service deserves recognition.

Yours sincerely, Roger Golding, 21 Wish Street, Rye, TN31 7DA. ⊕

VERNER EDWARD SUOMI

Verner Edward Suomi, internationally recognised as the "Father of Satellite Meteorology" died on 30 July, in Madison, Wisconsin, USA. He was 79.

Suomi was credited with numerous instruments, including the spin-scan camera used in many weather satellites. He taught at the University of Wisconsin in Madison until retiring in 1986. ⊕

SHAREWARE CORNER

Les Hamilton

From time to time I receive correspondence from members inquiring about registration of applications offered in Shareware Corner, or telling of improvements in the latest version. Occasionally I am alerted to problems, such as the case when Martin van Duinen tried to register Photolab. Despite several attempts at communication, his correspondence was returned as "moved - not forwardable". It would be interesting to learn if other members have had better success with this item. I have sent off an enquiry myself and am still awaiting a reply!

As the Shareware Library continues to expand following yet another year of additions, I will be giving some thought to slimming it down during this final quarter. Several programs have now been superseded by better and more modern applications and will be deleted come the March Journal. Consequently, all this quarter's new shareware is on Disk RIG-43, but will be allocated to Shareware Library disks in the next issue of the Journal.

Finally, apologies to members who have been using my program WPREDICT for Windows [Disk T-03]. A programming 'bug' resulted in the daily prediction screen locking up the computer when attempts were made to run predictions for the months October through December. This has been corrected in version 3.63, which now also includes interactive help. I will happily supply an upgrade gratis, to anyone who has been inconvenienced by this problem.

PREDICT (SPREDICT)

This is a new DOS program which can store Keplerian elements for up to 21 satellites and produce prediction tables featuring elevation, azimuth, phase, latitude, longitude and range data for an individual satellite. The program has been optimised for high speed, and supports both mouse and keyboard operations. It has facilities for storing your ground station parameters, while elements can be updated automatically from a file of elements in NASA 2-line format, or entered manually. A clever feature of the auto-update mode is that only more recent elements are added to the program file, while the original elements are retained in a backup file, 'just in case'. Additionally, Keplerian elements can be extracted from a file containing additional text.

When a satellite is called up, the program screens an orbit calendar for each pass, producing a set of parameters every five degrees of latitude while the satellite is above the horizon as seen from your ground station. Subsequent passes are displayed

instantly on clicking the left mouse button, for as far in the future as you require. Although the program does not print directly, pressing the Ctrl-Backspace key combination during the display sequence saves the screen data to a file called 'satname.txt' (where satname would be NOAA12, NOAA14 etc.), which can be viewed at leisure, or printed out from any text editor. This program is freeware. [Disk RIG 43].

PHOTOVISION PRO v 1.0 (PVP10)

Photovision is a new image viewing and enhancing program for Windows which should prove useful to RIG members. The program handles a large range of popular image formats, and loads files efficiently with the image starting to roll down the screen immediately it is selected. Perhaps the most valuable feature of the program is its ability to duplicate an image by means of the <File>/Duplicate option, then to show both copies side by side with the <Window>/Tile option. This means that filters can be applied to the copy, and the results compared with the original. If an effect does not work to your satisfaction, it can be reversed through the <Edit>/Undo option. A unique feature is the "Quick Preview" which is automatically invoked before some of the more lengthy filtering options are activated. This means that you can decide on whether an effect is going to be suitable without waiting several minutes for it to take effect!

Noise removal is always high on the priority list when improving wxsat images, and can be selected at 3x3, 5x5, 7x7, 9x9 or user-defined pixel depths from the <Image> Menu. While time-consuming, this feature really does work extremely well. I find that the 3x3 filter, though taking a few minutes to scan a 500kb image, is extremely effective, and produces very little loss of edge sharpness. There are numerous other filters to try if you wish to experiment. The usual saturation/hue/brightness/contrast and histogram equalisation features can all be selected under the <Color> Menu. If you like to annotate your wxsat images, the <Draw> Menu has everything that you need. You can draw an outlined rectangle on an image, in any combination of colours that you wish, then place appropriate text within it. Any of your computer's true-type fonts may be selected, and you have full control over its colour, style and size. Finally, Photovision offers a slideshow feature which is very easy to set up. You can save slideshow selections for recall later. I must confess that I found this feature very slow (using quite large GIF images) but it is certainly worth investigating. [Disk RIG 43]

SORTNENG (SN)

Have you ever wished for a simple program that will strip weather satellite elements selectively from one of the regular BBS files containing hundreds of sets of 2-line elements data? Well, this handy little utility does it. Running the batch file RUNME.BAT extracts your own preferred satellites from a file called TWOLINE.TLE and saves them as the file NASA.TLE. To achieve this, you must edit the file

WANTED.SAT to contain the names of the satellites you require, and rename the master 2-line file as TWOLINE.TLE. The program is freeware. [Disk RIG 43]

SYSCHECK v 2.39

SYSCHK is a DOS program that provides valuable diagnostic information about your computer system. Included are computer model, microprocessor type, system BIOS and extensions, mouse, ports, disk drives, video type and chipset, memory, resident programs, device drivers, throughput speed of system etc. etc.... [Disk RIG 43]

QPEG v 1.5E

This is a significant upgrade to what is claimed to be the fastest viewer available for JPEG (and GIF) images. There is a new install program, while a serious bug affecting BMP files has been rectified. [Disk RIG 43]

UPGRADE NEWS

VUPRINT v 4.0 is now available. Now a 16-bit application, it is not only a superb image viewer, it also has the capability of generating slide shows accompanied by sound from .WAV or .MID files. It now has a movie facility for running .AVI files using MSVideo for Windows runtime [Disc V-02]

The Windows-95 version of GRAPHICS WORKSHOP, version 11r, is now available on the GWS disk.

DECEMBER ADDITIONS TO THE RIG PC SHAREWARE CATALOGUE

Disk RIG43: PREDICT, SORTNENG, *PVP10, QPEG15E, SYSCH239.

SHAREWARE TITLE CATALOGUE

Disk A-04: *Earth Centred Universe, Lunar Eclipse, Skyglobe, Skyview, Solar Eclipse Predictor, Solar System Finder.

Disk A-05: *Skymap - Planetarium to display and print star charts etc.

Disk C-02: Hamcomm, JVFAX-70, Packet Monitor, RTTY_FAX, Satcom.

Disk F-01: CUTNOAA, DATtoPA2, JOIN-PIX, NOATIFF, CHOP, REJOIN.

Disk I-04: *Image Commander, GIF Palette, GIFtoJPG, *Iphoto, JPEG5386, JPGtoGIF, *Paintshop Pro, *VuePrint v2.2.

Disk I-05: Graphics Workshop for DOS, IMDISP, Neopaint V3.0.

Disk I-06: *Graphics Workshop for Windows, *Lview Pro, *Photolab.

Disk T-03: AOS, AOSUS, NOAATime, Predict, *SatTrack, Weather Satellite Tracker, Wpredict.

Disk T-04: Bird Dog 3, PC Track, STS Orbit Plus.

Disk T-05: *WinOrbit, *Logsat.

Disk U-02: Adjust Clock, BBC Time, Clockwork, PC Configuration, Fast Geo-chronometer, Geoclock, Make PCB, PKunzip, Screen Thief, SSTV FAX.

Disk U-03: *RIG Journal Index, RIG Shareware Catalogue, HURRTRAK V.5.0 (1994 version), *WINSTORM, Weather Forecast.

Disk V-01: Compushow, GIFdesk, GIFEXE, GIFREED, QPEG, VPIC, *WINECJ, SVGA.

Disk V-02: *GDS V 3.1, PVE, *VUPRNT40.

Disk PSP: *Paintshop Pro V 3.0.

Disk GWS: *Graphic Workshop V 1.1r.

Disk Belmont: *Belmont Image Technician (sophisticated image processing suite).

Programs requiring Microsoft Windows are indicated by an asterix (*)

HOW TO OBTAIN COPIES OF THE RIG SHAREWARE LIBRARY DISKS

There is a despatch fee of £2 per order, which covers up to 6 disks (i.e. not £2 per disk). Send up to a maximum of 6 formatted 1.44 Mb MS-DOS 3.5" disks per request, to Les Hamilton, 8 Deeside Place, Aberdeen AB1 7PW, Scotland. Disks must be sent in a sturdy, re-sealable package such as a padded Jiffy bag (or a package within a package). Each separate request must be accompanied by:-

i) a self-addressed adhesive label
ii) stamps for the return postage
iii) coins (or additional postage stamps) to the value of £2.

Note that overseas members' return postage is free, but an exchange of shareware or satellite images in lieu is always welcome.

Any RIG Member coming across any new or updated versions of useful shareware is encouraged to send them to me at the above address. Should you experience any problems running any of the shareware from the RIG Library, please enquire by letter, and I'll reply by return of post. ⊕

MEMBERS' ADVERTISEMENTS

Members may advertise surplus equipment etc. for sale in the journal free of charge but subject to space being available. Advertisements should be concise and must pertain to RIG activities. They should be submitted to the journal editor and not the advertising manager.

WANTED. APT Users' Guide from NASA. Also circuit diagrams and information on the following: Muirhead D649LE fax printer, Samsung S1-1201 oscilloscope, Brookdeal Telsec laboratory chart recorder type CR81. I will reimburse postage and photocopying costs. Graham Smith (GIJVZ), 3 Beech Hill Crescent, Mansfield, NG19 7EW. 'phone 01623 662862.

WANTED. Framestore; Timestep, Maplin or VHF Comms. Preferably working but incomplete project also considered. NG Armstrong, G3KKN, 01594 832494 evenings.

FOR SALE. MUST dispose of a Dartcom APT system (the company's own professional version) comprising turnstile antenna, preamp, scanning receiver, digital signal processing unit, software (suits Western Digital chipsets but upgradeable to Windows and any chipset) and Landsat disks, plus manuals. All for £350 - but could be split. Phone Paul, G4XHF, 01622 696437 (work) or 01293 413961 (home, evenings).

FOR SALE. Timestep PROscan Receiver 4.1, Dartcom Meteosat downconverter (in waterproof box), Timestep PCwSat3, IBM/PC Comp.sys, Timestep VHF preamp boxed 12v coax-fed, TH2 loop Yagi antenna, crossed dipoles antenna + power supply, junction boxes etc. Can be seen working. £400 ovno. Illness forces sale. Buyer dismantles and collects. Contact Joe, 01702 294842 (Southend).

FOR SALE. Complete Timestep PDUS system. Leaving country, must sell. Any reasonable offer accepted. Would consider exchange for laptop/notebook computer. Clive Baldwin 0161 928 7396 or email Clive@henley.its.net.

ORBITING UPDATE

ALL THE LATEST NEWS

POLAR ORBITING SATELLITES

NOAA 9 developed serious problems on 3 August. The power supply has been stabilised and some instruments are operating but following the failure of the Manipulated Information Rate Processor, no further imaging is possible.

NOAA10 is still imaging in channels 1 and 2 but the APT transmitter remains off.

No further imaging is possible from NOAA 11 though some other instruments are in a working condition.

NOAA 12 continues as the operational morning-southbound craft with most systems operating normally.

NOAA 14 is healthy and is the operational afternoon-northbound craft.

NOAA K (NOAA 15 when in orbit) could be launched as early as April 1996 but, provided NOAAs 12 and 14 remain healthy, a late 1996 launch is more likely.

Baffin Island. Meteor 3-5, 29 September 1994

METEOR 2-21 is on at the time of writing (8 November) and is filling the gap whilst Meteor 3-5 is crossing temperate northern latitudes at night. Images continue to be mostly poor.

METEOR 3-5 has produced some very good imagery during the late summer and is expected back on by mid November when the southbound afternoon passes become better illuminated. These southbound passes will precess through local noon around the time of the winter solstice permitting good imagery during the shortest days. Baffin Island lies at the western extremity of the area within the range of polar-orbiters for UK members but Arthur Holmes from near Toronto received this good view of the island on 29 September.

Nothing has been heard from METEOR 3-6 for a long time but it may be premature to write it off.

OKEAN 4 is still operating well after more than a year in orbit. This series is not renowned for its longevity.

SICH 1 was launched from Plesetsk on 31 August after a delay of about 30 hours. All passes were monitored but it was the following day before the first images were seen. Only the visible sensors were on initially and it was several days before the radar and 8mm scanning microwave radiometer were activated. Transmissions are on 137.4MHz, the same as Okean 4 and, because transit times over the UK were close to Okean's on 1 September, several members reported Sich signals. Brian Dudman, Bertil Aquilon and Ron Hogben were among the first.

Heinz Hildebrand sent a few facts and figures about Sich which he obtained from representatives of the National Space Agency of Ukraine at the CeBIT fair in Hannover, Germany. They confirm that Sich is just another name for Okean. Geoff Perry saw a model on display at the Paris Air Show this year and he confirms the similarity. The spacecraft are designed and built in the Ukraine and the control of the Sich spacecraft is being transferred in stages from the Military Space Forces of the Russian Federation to the National Space Agency of Ukraine in Yevpatoriya according to Valeriy Komarov, first director-general of the National Space Agency. He added that another Sich-1 craft , to be known as Sich-1F would be flown in 1996 as would the first of the new Sich-2 series whose construction had now entered the final phase.

Geoff Perry obtained some information on Sich-2 (also known as Okean-O) at the Paris Air Show. At 6,700kg they have more than three times the mass of Sich 1 and will be launched into near-circular sun-synchronous orbits between 670 and 900km altitude by Zenit launch vehicles and are designed to operate for three years.

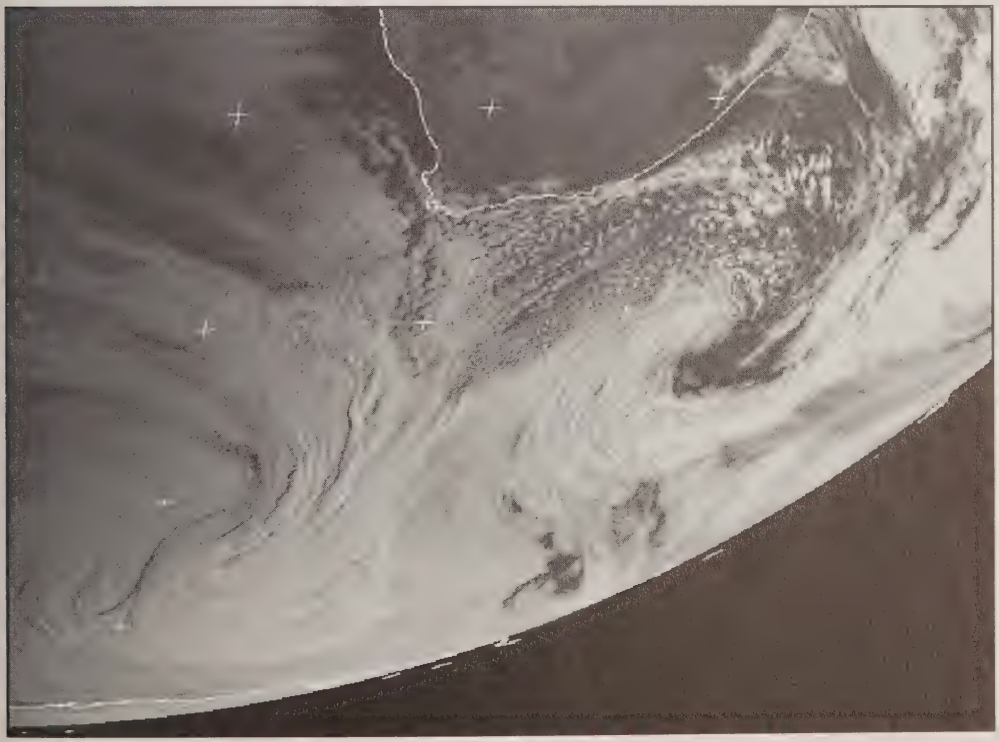
A secondary payload was launched with Sich 1. The FASat Alfa microsatellite, which

uses the Surrey Satellite Technology's UoSat bus, contains imaging and communications experiments for the Chilean Air Force but failed to separate from Sich 1 and is inoperative. The performance of Sich 1 seems to be unaffected.

GEOSTATIONARY SATELLITES

METEOSAT 3 completes its standby phase near to GOES 8 shortly and its remaining hydrazine fuel will be expended over a three day period from 21 November to raise the satellite 350-500km above the geostationary height. After a ranging exercise to determine orbit parameters all spacecraft systems will be turned off.

METEOSAT 4 was boosted out of geostationary orbit on 6 November following an extended test period to validate the new EUMETSAT ground segment. By the 10th, deorbit and switch-off will be completed. Apart from the fuel required for obligatory deorbit, the Meteosat 4 station keeping fuel was all used up and the satellite's inclination had already reached 1.8 degrees and was slowly increasing. (Meteosat is normally kept within plus/minus 0.3 degree inclination).



Sunrise over the Southern Ocean. Meteosat 6, 26 October 1995.

METEOSAT 5 remains the operational satellite with no anomalies to report.

METEOSAT 6 is the operational standby. Good progress has been made with the development of onground correction software to compensate for the image anomaly seen in IR and WV images. When the anomaly is present (and at times it totally disappears) and the on-ground correction applied, images and products derived from them are completely acceptable.

The accompanying image was received by Peter Wakelin during Meteosat 6 tests. This PDUS image was received on a 1.2m dish. The signal was very strong and did not exhibit the fluctuations seen on Meteosat 5 caused by the faulty dipoles. No WEFAX was being disseminated and probably no MDD data either, so plenty of power was available for PDUS. Dave Cawley tried a 90cm dish and reported acceptable results!

Progress with the hand-over of satellite operations from the European Space Operations Centre (ESOC) to EUMETSAT is going smoothly and EUMETSAT expects to take over all missions of Meteosat 5 on 15 November (Meteosat 6 will be operated by EUMETSAT from 14 November). ESOC will provide backup until midnight on 30 November after which date EUMETSAT will have full and sole responsibility for all remaining satellites, their missions and the user interface.

24 hour encryption of HRI data will commence on 4 December 1995 starting at 1130 UTC. 6-hourly HRI formats at 00, 06, 12 and 18UTC will not be encrypted. WEFAX is also not encrypted.

GOES 7's imagers will be deactivated on 11 January 1996 and placed in standby mode. By that date GOES 9's westward drift should have brought it to 130W and imager and sounder functions, as well as West DCS, West WEFAX and Space Environment Monitor operations will be transferred to the new spacecraft.

GOES 8 is the operating GOES-East spacecraft at 75W and is functioning well.

GOES 9 is nearing the end of its long checkout phase at 90W. Its infrared detectors were decontaminated in late October and the rapid-scan mode will be in use until 4 December for science tests. The entire contiguous US will be scanned at full resolution at three minute intervals. On 5 December GOES 9 begins its degree-a-day drift towards its operational longitude of 135W. Imaging will continue during the move and it should reach 135W on 18 January.

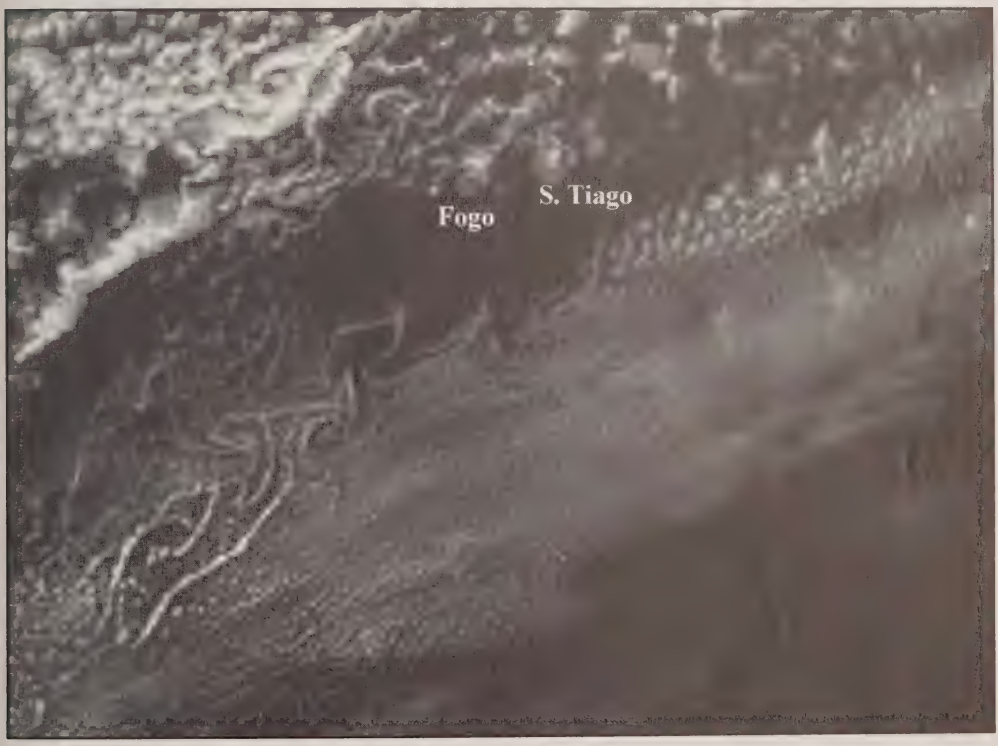
There's no further news to report on GOMS 1.

Acknowledgements: I am grateful to the following for their assistance in compiling

this report; Gordon Bridge, EUMETSAT; Douglas Isbell, NASA; Franklin O'Donnell, JPL; Jonathan McDowell, Harvard Smithsonian Center for Astrophysics; Dave Cawley and finally, numerous NOAA staff. ⊕

KNOTS IN THE SKY

The northeast trade winds produced these unusual patterns downwind of the Cape Verde Islands. I believe they are caused by von Karman waves but can find little about the mechanism causing them. Explanations and further examples (Hawaii perhaps?) would be much appreciated. Ed. ⊕



WANTED. Satellite dish, feed and downconverter. Francis Greaves (Southampton) 01703 845295 or Compuserve 100342,344.

WANTED. Could anyone sell or lend me a tape recording of Meteosat for test purposes please? KG Attkins, G6CDD, 30 The Brow, Woodingdean, Brighton, BN2 6LN.

KEPLER ELEMENTS

NOAA 10
1 16969U 86073A 95313.93044233 .00000041 3877
2 16969 98.5139 312.4476 0012306 280.7974 079.1815 14.24962850475237
NOAA 12
1 21263U 91032A 95313.92393927 .00000143 7069
2 21263 98.5777 334.1799 0012173 190.9342 169.1572 14.22573520233142
NOAA 14
1 23455U 94089A 95313.76928014 .00000070 3881
2 23455 98.9186 255.2345 0010024 137.7889 222.4072 14.11545311044359
METEOR 2-21
1 22782U 93055A 95313.62339335 .00000043 4401
2 22782 82.5486 161.9424 0020861 234.8800 125.0403 13.83042234110642
METEOR 3-5
1 21655U 91056A 95311.96857625 .00000051 8536
2 21655 82.5498 117.4162 0014145 010.0693 350.0715 13.16842521203428
METEOR 3-6
1 22969U 94003A 95313.25520053 .00000051 2091
2 22969 82.5553 056.3747 0016846 070.1720 290.1221 13.16731929085970
OKEAN 4
1 23317U 94066A 95312.25761131 .00000211 1079
2 23317 82.5413 263.1682 0028153 080.9326 279.5067 14.73972407057840
SICH 1
1 23657U 95046A 95312.20392522 .00000258 0291
2 23657 82.5339 044.8735 0029648 050.7907 309.5928 14.73429097010141

Frequencies: NOAAs 9/14 137.62MHz, NOAAs 10/12 137.50MHz
METEORs 137.30, 137.40 or 137.85MHz
OKEAN 4, SICH 1 137.40MHz

Explanation of elements format above:

Line 1: NORAD catalogue number, International designation, Epoch, Decay rate (NDOT/2), Bulletin number (thousands omitted), Checksum (1 digit).

Line 2: NORAD catalogue number, Inclination, Right Ascension, Eccentricity (decimal point omitted), Argument of perigee, Mean Anomaly, Mean motion (8 decimal places), Rev. number, Checksum (1 digit).

RIG GIF LIBRARY

Peter Wakelin

I have had several requests for the sequence of HRPT images of the British Isles used in my image interpretation article in the last issue. These 4 images together with the ERS 2 image of Britain and Ireland reproduced on the inside front cover of the same issue are now available on disk 141.

Disk 142 contains a single image of hurricane Marilyn on 16 September. It is a high resolution (about 1km) GOES 8 image similar to Fig. 4 in my article on hurricanes in this issue but covers the entire storm in great detail. The image is almost 1500 x 1200 pixels in size and some simple viewers such as VPIC may not be able to view the entire area.

Disk 143 is made up of images from Okean 4 (also known as 1-7) and Sich 1. They are mostly radar images of Europe but a couple of recorded images from remoter parts are included. This disk may appeal to some of our more distant members as neither the Okeans nor Sich 1 transmit very much when out of range of eastern Europe.

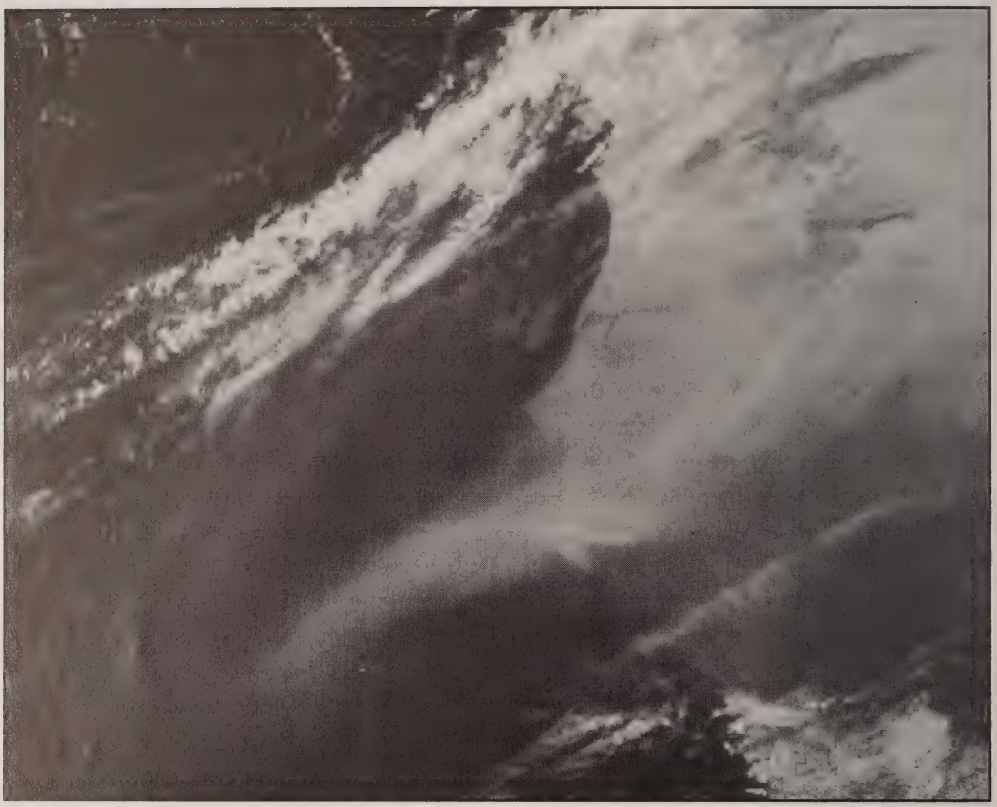
There were numerous requests for Ferruccio Paglia's HRPT images on disk 139 and I have made up disk 144 from three nicely processed Meteosat 5 PDUS images of his.

More PDUS images appear on Disk 145. They are from my own database and are mostly of Africa. One of them is reproduced here.

Finally, I am assembling a selection of images of this year's Atlantic hurricanes on disk 146. This includes the coloured map of their tracks which appears on the inside back cover of this issue.

The disks now available are those listed in RIG 40 plus the following:

139	NOAA HRPT Europe, Mid East, N Africa.	Ferrucio Paglia
140	Hubble Space Telescope images.	STScI
141	British Isles cloud dispersal. NOAA HRPT.	P. Wakelin
142	Hurricane Marilyn. One high res image.	GOES 8
143	Okean and Sich images.	
144	Meteosat 5 PDUS images.	F. Paglia
145	Meteosat 5 and 6 PDUS images of Africa.	P. Wakelin
146	1995 Atlantic hurricanes.	



Saharan sand blown out over the Atlantic Ocean.

HERE'S HOW TO OBTAIN YOUR DISKS

The cost is £2 for the first disk plus one pound for each additional disk with no limit to the number ordered. RIG provides disks, packaging and postage. For small orders, UK members may prefer to send postage stamps rather than write cheques for small amounts.

UK members: Cheque or postal order made payable to Remote Imaging Group and sent to Peter Wakelin, 1 Charters Road, ASCOT, SL5 9QF. There is no credid card service for members in the UK.

Other Members: Bank draft (in Sterling and drawn on a London-based bank) or Eurocheque made payable to Remote Imaging Group and sent to Peter Wakelin at the above address. Overseas members may prefer to pay by credit card (subject to a 3% surcharge). Credit card orders should also be sent to Peter Wakelin either by post or fax (+44 1344 26028). ⊕

RIG HELPLINES

General enquiries Meteosat information, NOAA information, Complaints about RIG-supplied equipment.	John Tellick	0181 390 3315

A copy of the Group's rules can also be obtained from John Tellick

Russian and Chinese satellite information	Peter Wakelin	01344 23200
HRPT	Peter Wakelin	01344 23200
PDUS	James Brown	01656 782632 *(not available on Sundays)*
Antennas and computing	John Boyer	01293 776862 *(7.00pm-9.00pm not Tuesdays or Wednesdays)*

Schools/educational co-ordinator	John Tellick	0181 390 3315

Schools/educational enquiries	John Murray	Torquay	01803 386252
	Frank Bell	Godalming	01483 416897
	Tom Walter	Reading	01734 871330
	Bob Coombes	Haslemere	01428 642930
	John Din	Bristol	01454 773387
	Alan Wright	Norwich	01603 713449
	Rob Bales	Merseyside	0151 3439300

Microcomputer specialists:

PC and printer problems	Mark Pepper	01344 777730 *(8.00pm-9.00pm)*
Commodore Amiga	Chris Pretty	01420 82752
Archimedes	Tom Walter	01734 871330

NOTE: We are grateful to the above members for offering their services to the Helpline. Please do not abuse the service by ringing them for queries other than those listed against their names.

Most of the helpline numbers listed under Schools/educational enquiries are situated in the south of England. John Tellick (address on page 2) would be pleased to hear from members in the educational field in other areas who would be willing to give help and advice. ⊕

REMOTE IMAGING GROUP

RIG SUBSCRIPTION - NEW MEMBER

If you would like to become a member and receive the Journal, photocopy this page, complete the form below, sign the declaration and send it to...

RIG SUB, PO BOX 142, Rickmansworth, Herts, WD3 4RQ, ENGLAND

The subscription rates for 1996 are...

UK membership	£10.00	Europe outside EC	£12.00
Europe EC	£12.00	Outside Europe	£14.00

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Do you require back issues? (see Rig Shop Corner) _____

Amount Enclosed £_____

Payment by Visa/MasterCard/Eurocard - there is no surcharge:

Card No._____ Expiry date_____

Signed _____ Date _____

Are you willing to have your name/address made known to members in your area? YES / NO. *(Delete as applicable)*

DECLARATION: I do NOT object to the Remote Imaging Group holding my Membership details on a computer.

Signed _____ Date _____

RIG SHOP CORNER

ALL PRODUCTS ARE FOR SALE TO RIG MEMBERS ONLY, FOR THEIR OWN PERSONAL USE AND NOT FOR SELLING-ON.
IN THE EVENT OF PROBLEMS WITH EQUIPMENT PURCHASED FROM RIG PLEASE CONTACT RIG IN THE FIRST INSTANCE AND NOT THE MANUFACTURER.

All prices shown include post and packing except where marked

Receiving / Decoding Equipment	**UK/EC Price**	**Overseas Price**
RIG*sat*-RX1 two-channel 137MHz self-build receiver.		
PCB, crystal IF filter and FETs	£12.00	£13.00
PCB and FETs only	£8.00	£8.00
RIG sat-RX1A 5-channel upgrade PCB	£4.00	£4.00
RIG DARTCOM Meteosat Downconverter. Assembled and tested module in tin plate box	£155.00	£132.00
Complete, assembled and mounted in weather-proof box.	£190.00	£162.00
RIG DARTCOM VHF Scanning Receiver. Assembled and tested module with LED channel number display.	£135.00	£115.00
As above but with LCD frequency read-out instead of LED channel number display. *Both the above items are modules and require a box, together with several components, switches, etc.*	£179.00	£152.00
RIG VHF Preamp. Includes a bandpass filter and is ideal for mast-head mounting. Assembled/tested module; needs boxing.	£18.00	£16.00
RIG 1695MHz Low Noise Amplifier kit. *Experienced constructors only.*	£29.00	£25.00
Martelec JVFAX Interface Unit	£78.00	£70.00

Connecting lead £5 extra (specify whether 25 or 9-pin required)

Antenna systems	UK Price
RIG CROSSED DIPOLES A Turnstile type design, in kit form	£26.00
RIG/TH2 47-element YCV loop Yagi (1.7GHz)	£85.00
JAYBEAM 5X-Y 2m 5 element crossed Yagi, in kit form	£55.00

DISHES, FEEDS and BACKING PLATES not available by mail order. Contact Henry Neale. Tel:01945 440353

Crossed dipoles and the YCV loop Yagi can be dispatched overseas. Postage extra. Details on request from Peter Wakelin.

RIG Binders

UK Price £4.00 each, EC/European Price £4.50, Outside Europe Price £5.00.

CD-ROMS	UK Price	EC Price	Other Price
Meteosat No. 2, Weather in Motion	£12.50	£13.50	£15.00

Back Issues of RIG Journals

		UK Price	EC/Europe Price	Outside Europe Price
RIG 8-11	1987	£5.00	£6.00	£7.00
RIG 12-15	1988	£5.00	£6.00	£7.00
RIG 16-19	1989	£5.00	£6.00	£7.00
RIG 20-23	1990	£6.00	£7.00	£8.00
RIG 24-27	1991	£6.00	£7.00	£8.00
RIG 28-31	1992	£6.00	£7.00	£8.00
RIG 32-35	1993	£6.00	£7.00	£8.00
RIG 36-39	1994	£6.00	£7.00	£8.00

Note: Prices quoted are for a set of four, including Post and Packing.

RIG 1-7 are currently out of print. Owing to depletion of some issues, photocopies may be supplied. Individual issues are no longer available (hardship cases excepted).

Ordering Information

All items are available from the Editor, Peter Wakelin (address on page 2) and include return by UK 1st class mail (except antennas and Journals). Items to non-UK addresses sent via airmail.

UK VAT is now applicable on sales to the following EC countries - France, Germany, Belgium, Portugal, Spain, Republic of Ireland, Austria, Sweden, Denmark, Italy, Luxembourg, Netherlands, United Kingdom (including Isle of Man). Members in these countries should use UK/EC price when ordering. EC members who are registered for VAT must forward their VAT registration No. to the Treasurer to enable them to receive VAT exempt goods.

As UK/EC prices now include VAT where applicable; receipts will be issued upon request. Remote Imaging Group VAT Registration No. 594 7483 83. Channel Isles: divide by 1.175 to remove VAT content.

UK members, By Cheque or Postal Order.

Overseas members, Pay by Bank Draft (drawn on a UK London-based bank) or Eurocheque(s). (Payments to a Maximum of £100.00 in any one Eurocheque). No local currency please.

All cheques made payable to *"REMOTE IMAGING GROUP".*

Credit Cards Accepted (Access/Visa/Mastercard/Eurocard) Add 3% to Total. Available by MAIL ORDER from Peter Wakelin (address on page 2) or FAX 01344 26028 (International +44 1344 26028).

Please state type of card, Card No., Expiry Date.
All Credit Cards authorised before goods are despatched.
(Note: Ordering by Credit Card does not mean instant despatch!) ⊕

When contacting Advertisers please menion that you are a member of RIG.

BULLETIN BOARDS

Orbital elements and other information of use to members are available from several electronic bulletin boards. The three listed below all offer free service and are available 24 hours a day. In addition to orbital elements (in both Amsat and NASA 2-line formats), the Timestep service include regularly updated weather satellite status reports indicating which ones are transmitting and their frequencies. The RIG board also offers a range of shareware programmes.

Telephone numbers:	RIG BBS	01945 440666 8bit, no parity, 1 stop bit
	Timestep BBS	01440 820002 8bit, no parity, 1 stop bit
	Dartcom BBS	01822 88249 8bit, no parity, 1 stop bit

SUBMISSION OF ITEMS FOR PUBLICATION AND COPY DEADLINES

Please send contributions, which should be original, to the Editor. Although typed and hand-written items are quite acceptable we would prefer longer pieces to be on a PC disk in one of the popular word-processing formats, ideally in Word Perfect. Drawings and diagrams may be submitted on disk, preferably in a Windows Meta File compatible format, but please send hard copy also. Diagrams and images must be in separate files and should not be embedded in documents. To reproduce well, satellite images must have a good range of tones. Contact the Editor for further information.

COPY DEADLINE FOR THE MARCH ISSUE: 25 January 1996

Advertisers' copy is required by 25 January 1996 and should be sent direct to Michael Gill (address on page 2).

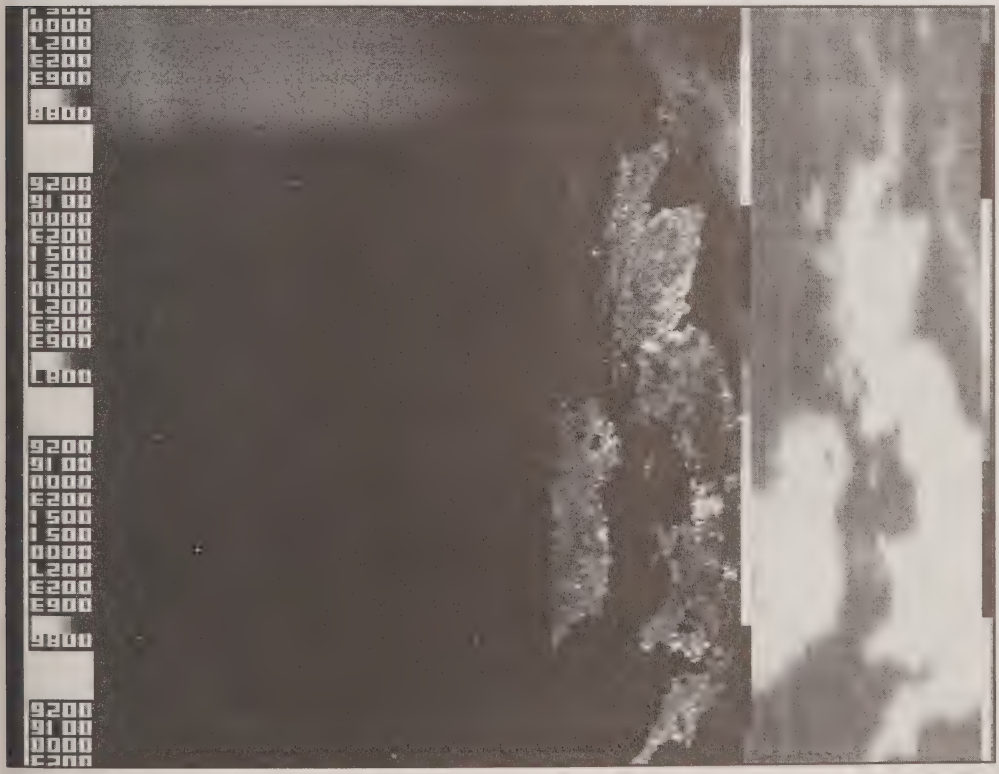
LATE NEWS:

DESCRIPTION OF COVER IMAGES

Front and Back Covers:
Details of this image appear on the back cover.

Inside Front Cover:
Top picture: Frank Wood provided this photograph. For a caption he suggests "There's an overhead pass of NOAA 12 in 20 minutes, son!" Do readers have any alternative suggestions?
Lower picture: A sample screen from Timestep's new PROsat for Windows system. See James Brown's review in this issue.

Inside Back Cover:
This map depicts the tracks of 1995 Atlantic hurricanes and was prepared at the Center for Ocean-Land-Atmosphere Studies, Calverton, MD. Further details appear in Peter Wakelin's article Atlantic Hurricanes Galore in in this issue.



Brian Dudman captured this rare radar image of the UK from Okean 4 at 2235 UT on 9 September 1995.

Sich 1 imaged its birthplace in Dnepropetrovsk at 0854 UT on 12 November 1995.

Michael Gill received this image of extensive flooding east of the Caspian Sea from NOAA 14 near the eastern horizon at 1042 UT on 28 October 1995.

A quarterly publication for hardware, software and applications of WEFAX, APT, VAS, HRPT and GOESTAP.

WeatherSat Ink

The Environmental Satellite Applications Journal

4821 Jessie Drive, Apex, NC 27502, USA

$15 US per year $20 all others, US funds

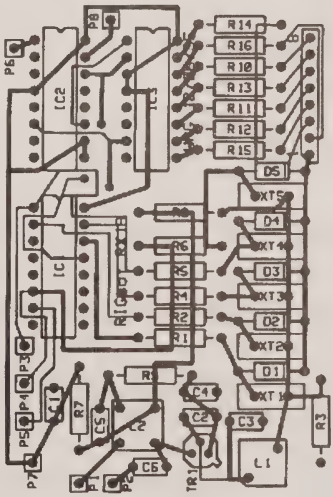
MasterCard / Visa OK with $1 surcharge

RIG*sat* RX1A

5-channel upgrade for the RX1. Small, convenient add-on with numeric display. Can be configured for 3, 4 or 5 channels.

Supplied as printed circuit board 8cm x 5cm with plated through holes and silk-screened component layout. Full instructions are included together with parts ordering information.

Prices including post & packing: UK £4. Overseas £4.50. See Shop Corner for ordering procedure.



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Just contact us and state your requirement.

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Sensible prices: Special discount for RIG members:

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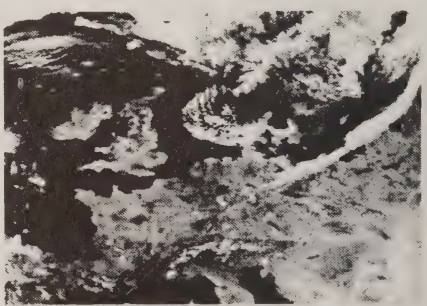
Fax : 0843 - 862212



TH2SAT PC Weather Satellite Processing System Version 2.2

- Instantaneous control of input levels from keyboard while receiving
- Input levels automatically saved
- Large range of *simple to operate* image processing commands
- Very simple image pseudo-colouring facilities (including infra red)
- High definition images obtained due to high 4800 hertz sampling rate
- Colour animation included as standard
- Fully working demonstration program available for £3.50

Price £100 + postage (RIG members)

APT Hardware Software & Systems

MSR50 Virtual Satellite Receiver

A new and really exciting way to receive weather satellites. The MSR50 is a very high performance, synthesised receiver, totally controlled from your PC (IBM compatible or Amiga), providing unrivalled performance and features at a very modest price. For details see the feature elsewhere in this issue of the RIG journal. The MSR50 is supplied complete with software (either PC or Amiga), and cable.

Special Introductory Price £150.00 (incl. carriage & VAT)

MSC30 Downconverter

Our policy of continual development ensures that the MSC30 Downconverter remains the finest you can own. Features include very low noise figure, high gain, buffered output for driving long cables, and good temperature stability. The MSC30 is housed in a professional sealed diecast box, and can be powered either via the coaxial feed, or by a conventional 3-wire system. High-quality N-type input, BNC output. Comes complete with 1.25m N-type/N-type cable, all connectors, and even silicon weather-proofing tape!

£205.00 (including carriage & VAT)

MSF30 1.7GHz Dipole Feed

A precision machined dipole feed suitable for Meteosat/GOES/GMS dishes with an f/d = 0.35 - 0.42. Features adjustable focus and polarization. N-type output socket.

£56.00 (including carriage & VAT)

MSH20 Professional 137MHz Crossed Dipole

A very rugged, well made turnstile. Comes with stainless-steel fastenings, and 20m terminated feed cable. **£59.50 (including carriage & VAT)**

MSA20 137MHz Crossed Dipole

Standard turnstile antenna. Comes complete with 20m terminated coaxial feed.

£49.50 (including carriage & VAT)

MSK30 VHF Preamplifier

A low noise 137MHz preamplifier in sealed diecast box. This new design offers low noise (typ. 1dB) & gain = 10dB **£23.50 (including carriage & VAT)**

Also available without case as MSK30M **£18.80 (" " ")**

Ordering Information

Prices shown now include VAT for UK and EU countries. For all non-UK countries additional carriage will be charged at cost.

Payment may be made by cheque, postal order, or Visa/Acess/Mastercharge cards.

martelec *communication systems*

The Acorns, Wyck Lane, East Worldham, Alton, Hants. GU34 3AW Tel/Fax 01420 82752

Timestep Offer to RIG Members
PROsat II Capture Card

PROsat II has become the most widely respected and definitive Weather Satellite Capture program used by RIG members. It will operate in most contemporary PC's (286, 386, 486 etc with SVGA) and uses one internal slot. All software features are selected with user-friendly mouse-operated pull-down menus. False colour can be added to good quality visible light images. Capable of receiving and decoding all known analogue weather satellites, PROsat II sets new standards in Software and Hardware design. Image processing, full colour animation and 3D are just some of the many features currently included. New features are constantly being added. Now technical support is directly from Timestep. Timestep Weather satellite systems are used and recommended by Arthur C. Clarke, author of "2001 : A Space Odyssey" and inventor of the communications satellite.

Other software comes and goes, sometime the flavour of the month, sometimes forgotten.
PROsat II just gets better and better ! When the new Okean 4 was switched on, it came as no surprise that PROsat II users merely clicked on OKEAN and achieved perfect results, first time.

Geostationary Satellites Meteosat, GOES and GMS are all geostationary satellites; they orbit at the same rate as the Earth and hence appear to be fixed in the sky. Images are therefore constantly available. The PROsat II system covers all known analogue geostationary satellites; images of the Earth's surface can be received as often as every 4 minutes. A small dish antenna is required together with some simple reliable hardware.

Polar Orbiting Satellites NOAA, Meteor, Okean and Feng Yun are polar orbiting satellites. They pass near to the poles about every 110 minutes. Each satellite passes over most countries twice a day at a different time each day. Their strength is such that a simple fixed antenna can be used. Direct readout of temperature along with latitude and longitude is an important feature of the software. Now land/sea and political boundaries can be superimposed on to the image and "nudged" if they are not quite perfectly aligned. All of the satellite data is stored; a full view of Infrared and Visible images are shown on the screen during reception.

Colour Animation Full screen, full colour animation is now standard. Up to 1,000 images can be automatically animated. The colour is realistic and computer processed (D2 section only) and even shows relative temperature by the shades of blue for the sea and green for the land. Clouds show up as white and shades of grey. Reception is completely automatic. Run the software and walk away; every time you pass, the computer will be showing the very latest sequence.

Geostationary Features
Images as often as every 4 minutes
Live display of incoming images in 64 grey scales
Auto schedule to save images
Pan and zoom to greater than pixel level
3D display
Median filter to remove country outlines
False colour with AutoSet
1,000 frame colour animation (option)
Transect between any two points
600 DPI, 300 DPI and dot matrix printing
Windows export
Annotation

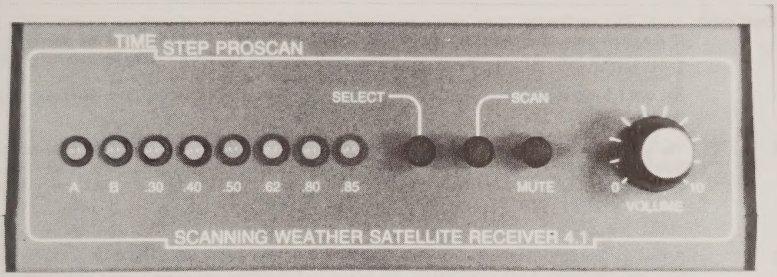
Polar Features
Reception of all polar satellites
Live display of incoming image in 64 grey scales
Auto schedule to save images
Saves the complete pass in full resolution
Temperature readout with no calibration
Latitude and Longitude gridding
Country and State outlining
Distance and Bearing between any two points
Your location shown on image
600 DPI, 300 DPI and dot matrix printing
Windows export
Annotation

Track II The tracking program used by most serious satellite watchers. This is not public domain and was written by Peter Arnold our Cambridge Graduate. Up to 6 satellites can be shown on screen all at the same time. Actual locations, their footprints and their rise and fall times are always shown. To our knowledge, no other program provides these features.

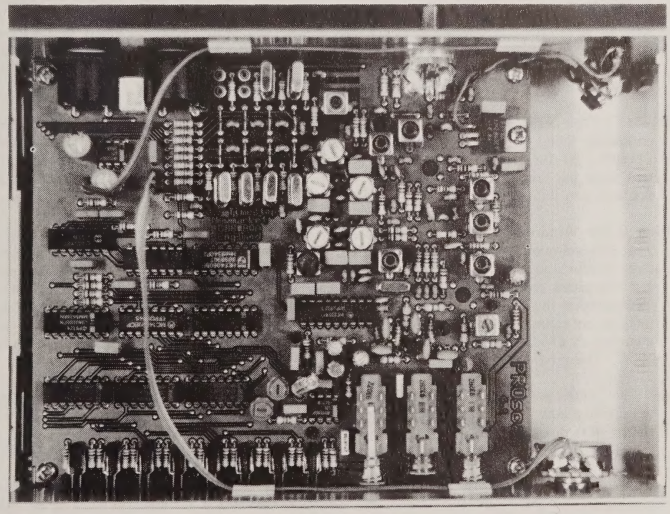
PROsat II card/software including Colour Animate & Track II £99.00
PROsat/PROscan connecting cable £12.00 All prices plus £6.00 carriage & VAT at 17.5%

Timestep PO Box 2001 Newmarket CB8 8XB England
Tel. 01440 820040 Fax. 01440 820281

Timestep Offer to RIG Members
PROscan Polar Receiver



What do you want from a Scanning Weather Satellite Receiver ? a) Intelligent squelch that only responds to weather satellites and is quiet when no satellite is present b) To be able to read the frequency directly from the front panel when it stops on a satellite c) To be able to "lock out" unwanted satellites d) Resistant to pager interference up to the pager transmitter itself (where of course the field strength is low e) Resistant to pager interference at 1 to 2 miles where the field strength is at a maximum f) An unconditional 12 month money back guarantee g) Full technical support directly from Timestep **and** h) the ability to control the receiver frequency from the computer so that you are sure that **all** passes can be received in your absence.



The PROscan receiver uses a lot of filtering, 3 coils in the pre-amp (optional), 4 coils in the RF amp (total 7 coils at RF), 3 coils in the oscillator, 1 matching coil at first IF, 5 ceramic filters at first IF, 5 coils at second IF (total 11 IF filters) and a quadrature discriminator for linearity and high ultimate signal to noise. A preamplifier is not required for short cable runs but adds extra selectivity and makes up for feeder loss on longer runs.
PROscan receiver £185.00 VHF Preamp in diecast box £20.00 **Computer controller** £125.00
UK postage £6.00 plus VAT at 17.5%

Timestep PO Box 2001 Newmarket CB8 8XB England
Tel. 0440 820040 Fax. 0440 820281

Trade Talk

** Winter news to **RIG Members** from Timestep **

APT Equipment At the RIG conference, many people expressed surprise at the range of products we had. Silly people ! If they had phoned for our full colour catalogue they would have known that we supply more Weather Satellite parts than anyone. In fact our policy is "If you Can Dream It - Timestep can supply it !"

So, don't hang around, pick up the phone now ! AND read our adverts, they do change from month to month.

PDUS The good news is that once you have bought the Key (from the Met Office/Eumetsat) and the Key Interface from us at just £150.00, you will get free access to whole earth images every 30 minutes and 2.5KM European images also every 30 minutes. Expensive; but like having NOAA every 30 minutes only twice as good !

HRPT Following intensive development we now have a helical feed that works as well, if not better, than the dual feed and combiners AND it's £100.00 less to use ! It's lighter and doesn't need such elaborate metalwork to hold the dish to the rotator, hence the dish price is down too ! And it's available without the ground stand that you can get cheaper from your local TV satellite supplier. The new **analogue** card is now out and gives images as low as 0.5 degree. The tracking controller comes with a modified version of Track II and works perfectly with all but directly overhead passes, giving you time to have a cup of coffee, read the paper, AND get the best images you can have.... at any price.

1.1Km resolution, 5 spectral bands, 10 bit data, 80Mb data files, false colour, multi-spectral colour from any 3 bands (requires Multi-spectral view II) and the greatest fun and resolution you are ever going to get (well for 10 years at least).

RIG Prices Timestep offer RIG members very preferential pricing. The price exists for the duration of the magazine, therefore pricing quoted in Issue Number 42 has now expired and the pricing in this issue will expire when RIG 44 is printed. If you are asking us for prices, you must identify yourself as a RIG member. If you do not mention RIG every time you will be quoted the standard list price. All prices to RIG members are cash with order, we cannot supply items to anyone other than yourself. Quotations if requested will be sent to your home address and reflect current RIG prices.

PROsat for Windows This new system reviewed in this issue is available from stock right now. New features are constantly being added and we expect it to become the new World Standard. The introductory price is £164.00. At this price there is unfortunately not an upgrade path. Your existing PROsat II for DOS cables will work just fine, but if you wish to take advantage of the automatic PROscan receiver channel switching function you will need a new cable at £25.00.

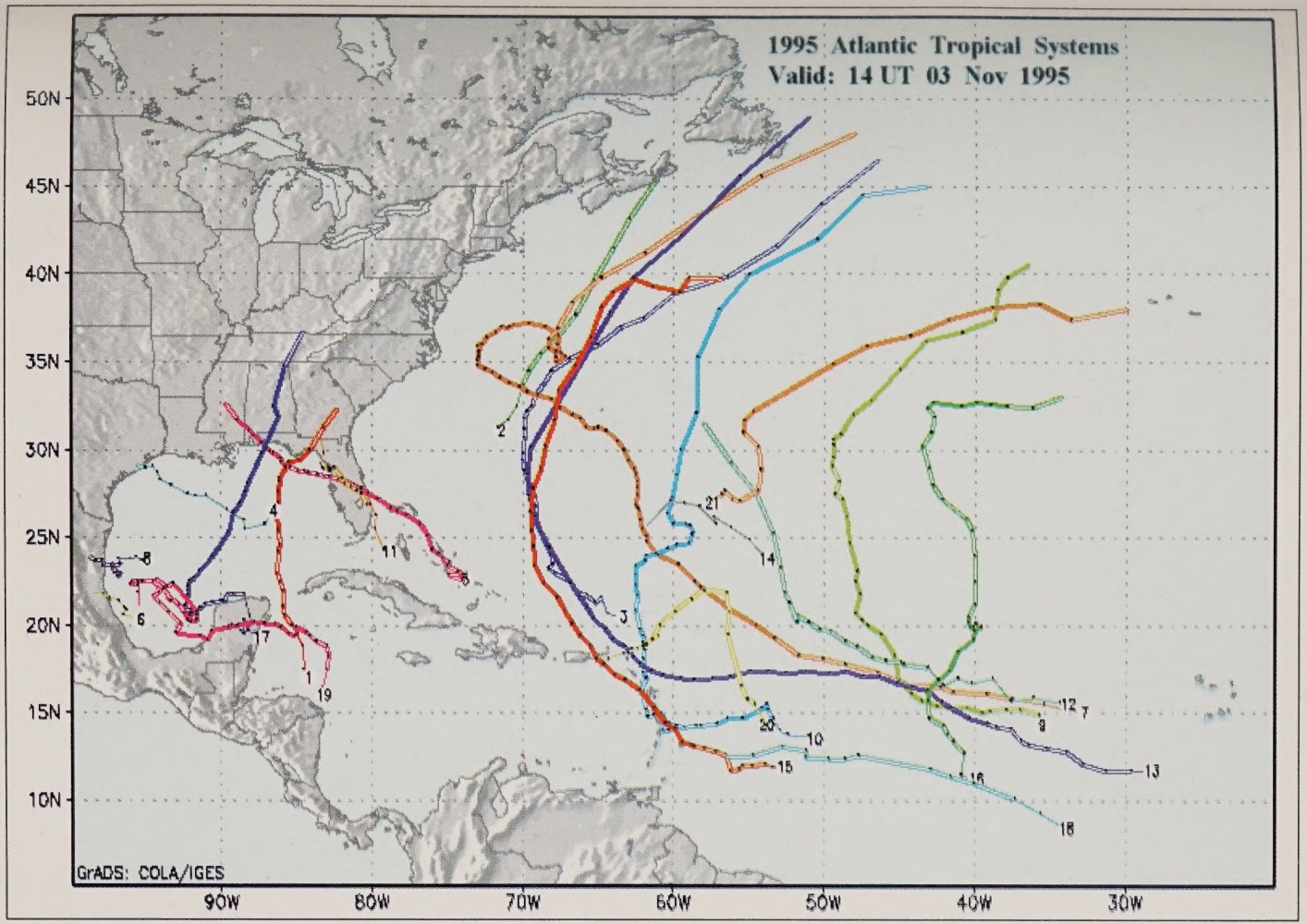
Multi Spectral View II for Windows The limitations of DOS video card drivers and resolution have now been lifted with this completely new Windows version. Multiple image windows can be viewed simultaneously and extra features such as cubic interpolation for smoother zoom, printing on any Windows compatible printer and vegetation index are just a few of the reasons to upgrade. Intended mainly for HRPT and LANDSAT interpretation this new version will produce composites of NOAA APT by combining Visible and Infrared images, an example of this can be found in the PROsat for Windows brochure. The new price to RIG members is £150.00 and upgrades to existing users are £100.00. A colour brochure will be available early 1996. The product is available right now.

Pager Interference Interference is still getting worse, the RF level appears to be the same but it's spreading all over the country now. Remember that our receiver is one of the best available and is on a 4 week money back trial. If it doesn't cure your interference or you just don't like it, we will take it back and refund your money. After selling over 2,000 of these receivers we have only had 2 refunds !

BBS Our BBS can be accessed by anyone with a modem. You do not need to be on Internet or have any complications. Plug the modem into your computer and that's it. No subscriptions no fees and no hassle. It is mostly updated every week and never more that 14 days old. Elements and news files and satellite status reports are easily down-loaded so that you can update your software and print the news out to read at your leisure. We can handle virtually any standard right up to 28.8. The number to call is 01440 820002.

All prices plus VAT at 17.5% and carriage at £6.00 in Britain. Visa and MasterCard credit cards taken on orders over £25.00.

Timestep PO Box 2001 Newmarket CB8 8XB
Tel. 01440 820040 Fax. 01440 820281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GrADS: COLA/IGES

This image shows colour-coded sea surface temperatures of the World's oceans as measured by sensors on board satellites. The key to the temperatures (regrettably only in degrees Fahrenheit) appears along the lower edge of the image. The temperatures have been averaged over a few days prior to 6 August which is close to the time of maximum temperatures in the northern hemisphere. Note that this summer the English Channel was warmer than the Pacific off California! These temperature maps are regularly updated by the Space Science and Engineering Center at the University of Wisconsin in Madison and are made available on Internet. [http://www.ssec.wisc.edu/data/index.html]